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THE EXAMINATION OF SOME DRUGS WITH SPECIAL REFERENCE TO THE ANHYDROUS ALCOHOL AND ETHER EXTRACTS AND ASH.*

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As announced in the first paper bearing the above title,[1] in the examination of a number of commercial samples of vegetable drugs, in addition to identifying the samples and making specified tests for added or accidental impurities, such as starch, etc., we have attempted to make some assays that would serve as a means for determining the relative value of the sample when compared with some other sample or standard.

These assays have consisted chiefly in determining anhydrous extracts, alcohol and water, ether, chloroform, or petroleum ether, as may be suggested by the nature of the drug.

Since the appearance of the first paper we have examined a number of drugs along the same lines. The results of this work are given in the list appended, which list not only includes many of the names appearing in the first paper but also many drugs not heretofore considered.

For some drugs the value of determining the amount of anhydrous matter that may be extracted with various solvents has been pretty well established, also the determination of ash. This has been recognized by the Ninth Revision Committee of the U. S. P., and it is indicated [2] that a large number of official drugs are to have anhydrous or volatile extract and ash standards.

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* Second Paper.

[1] First paper, Rippetoe and R. Minor, this JOURNAL, October, 1912, pp. 433–445.

[2] *J. A. Ph. A.*, March, 1914, p. 359.

Tabulation of Assays.

Sample	Sample No.	Alcohol extract Per cent.	Water extract, Per cent.	Ether extract Per cent.		Ash Per cent.	Remarks.
				Vol.	N. Vol.		
Agaric White	12573	62.05	.....	.....	.....	2.5	
Aletris.....G	11284	15.83 (49)	.....	.....	.....	17.96	Insoluble ash 85.47 per cent.
Aletris.....G	12783	16.68 (49)	.....	.....	.....	13.40	
Aletris.....G	13075	19.82 (49)	.....	.....	.....	11.29	
Allspice.....P	11347	.....	.....	3.73	6.11	3.44	Crude fibre 23.10
Aloes, Barb.....P	10898	74.14	80.07	.....	.....	2.68	
Aloes, Barb.....W	12557	97.20	81.00	.....	.....	2.10	
Aloes, Cape.....P	10899	76.59	82.16	.....	.....	1.20	
Aloes, Cape.....P	11139	90.49	62.74	.....	.....	4.03	
Aloes, Cape.....P	13256	92.50	67.50	.....	.....	1.50	
Aloes, Cape.....P	12517	84.20	63.70	.....	.....	4.70	
Aloes, Cape.....W	13373	88.52	61.16	.....	.....	0.81	
Aloes, Curacoa.....P	11138	92.19	72.66	.....	.....	2.55	
Aloes, Curacoa.....P	11843	92.03	73.75	.....	.....	2.85	
Aloes, Curacoa.....P	12929	89.48	71.99	.....	.....	3.19	
Aloes, Socotrine.....W	11016	84.60	52.71	.....	.....	5.08	
Aloes, Socotrine.....P	12890	84.09	52.91	.....	.....	5.34	
Aloes, Socotrine.....P	11140	83.62	52.85	.....	.....	4.65	
Aloes, Socotrine.....P	13185	84.00	52.85	.....	.....	6.50	
Althea Root.....P	11084	.....	21.22	.....	.....	7.08	
Althea Root Cut.....	11577	.....	28.60	.....	.....	6.93	
Arnica Flowers.....G	10897	20.81 (49)	.....	.....	.....	7.78	
Arnica Flowers.....G	12654	24.25 (49)	.....	.....	.....	6.80	
Arnica Root.....W	11037	18.72 (49)	.....	.....	1.45	8.93	Contained some flowers and leaves.
Arnica Root.....W	10750	21.13 (49)	.....	.....	.....	12.92	Contained some leaves.
Arnica Root.....W	10751	26.37 (49)	.....	.....	.....	6.64	
Asclepias.....G	12506	25.30 (49)	.....	.....	.....	3.95	
Asclepias.....G	13005	19.19 (49)	.....	.....	.....	3.51	
Asclepias.....G	13324	27.80 (49)	.....	.....	.....	6.03	
Avena Sativa.....G	13092	7.22 (25)	13.03	.....	.....	2.65	
Berberis.....G	13282	8.15 (49)	.....	.....	.....	2.15	
Buchu Short.....W	11219	20.30 (73)	.....	1.44	4.12	3.91	11.73 per cent. of stems.
Buchu Short.....W	11220	20.33 (73)	.....	1.40	4.12	4.13	3.47 of stems. 2.73 of foreign leaves.
Buchu Short.....W	11221	20.46 (73)	.....	0.87	3.67	3.80	21.79 per cent. of stems.
Buchu Short.....W	11794	22.53 (73)	.....	2.32	4.61	3.71	6.83 of stems.
Buchu Short.....W	11842	20.09 (73)	.....	1.36	5.25	4.15	13.40 of stems.

Buchu Short.....W	12052	17.45	.....	1.80	5.70	4.35	6.33 of stems
Buchu Short.....W	12053	16.90	.....	0.85	5.50	3.95	8.13 of stems
Buchu Short.....W	12054	17.80	.....	0.85	6.45	3.70	8.90 of stems.
Buchu Short.....W	12055	18.70	.....	0.75	5.05	4.60	15.18 of stems.
Buchu Long.....W	11331	19.56 (73)	.....	1.61	3.97	5.06	15.41 per cent. of stems and other leaves.
Buchu Long.....W	11691	19.87 (73)	.....	2.04	4.11	5.22	13.58 of stems.
Buchu Long.....W	12096	24.90 (73)	.....	0.90	5.00	4.20	14.12 of stems.
Buckeye Bark.....G	13301	9.1	11.3	0.20	4.2	4.1	
Calendula.....G	11679	25.94 (65)	.....	.....	.....	10.34	
Calumba Root.....P	12644	13.05 (65)	.....	.....	.....	5.88	
Cannabis Americana.....W	13357	20.6	.....	.....	17.65	8.20	46.75 per cent. of seed.
Cannabis Americana Seeds.	13357	23.35	.....	.....	25.7	4.25	
Cannabis Americana Seedless	13357	13.30	.....	.....	9.80	11.60	
Cannabis Indica.....W	10950	16.35	.....	.....	15.52	13.82	7.35 per cent. of seeds
Cannabis Indica.....W	11252	15.07	.....	1.81	13.57	13.95	4.16 per cent. of seeds.
Cannabis Indica.....W	11903	14.35	.....	.....	.....	15.05	4.41 per cent. of seeds.
Cannabis Indica.....W	11981	14.50	.....	.....	.....	14.20	5.76 per cent. of seeds.
Cannabis Indica.....W	12083	12.30	.....	.....	.....	14.70	4.50 per cent. of seeds.
Cannabis Indica.....W	12147	13.70	.....	.....	.....	14.50	5.30 per cent. of seeds.
Cannabis Indica.....W	13237	13.65	.....	.....	12.40	13.80	9.40 per cent. of seeds.
Cannabis Indica.....W	13547	14.80	.....	.....	.....	13.20	2.55 per cent. of seeds.
Cannabis Indica.....W	13593	14.00	.....	.....	.....	13.30	3.88 per cent. of seeds.
Cantharides.....P	11593	.....	.....	.....	20.60	4.88	
Cantharides.....P	11702	.....	.....	.....	17.36	7.04	
Cantharides.....P	13697	.....	.....	.....	12.35	7.21	
Capsicum.....P	11349	17.02	.....	2.38	16.49	5.05	
Capsicum.....P	11663	24.46	.....	.58	17.27	4.87	
Capsicum.....P	12077	.....	.....	.70	16.55	7.00	
Capsicum.....G	12509	19.50	.....	.6	17.88	6.25	
Caraway Seed.....P	11658	20.88	.....	4.30	18.82	6.94	
Cardamom Seed .....P	11166	4.16	.....	1.93	1.35	7.52	
Cardamom Seed Decort ...W	11092	4.67	.....	1.0	1.81	6.11	
Cardamom Seed Decort ...W	11122	6.02	.....	2.43	2.13	4.55	
Cardamom Seed Decort ...W	11943	3.95	.....	1.75	2.25	5.75	1.8 per cent. of foreign matter
Cardamom Seed Decort ...W	13186	3.20	.....	.35	2.10	5.85	
Cascara Sagrada.....G	10532	24.55	26.97	.....	4.61	.....	
Cascara Sagrada.....G	11888	25.69	27.36	.....	4.28	.....	
Cascara Sagrada.....G	.....	22.20	28.05	.....	4.37	.....	
Celery Seed.....P	11605	22.4	.....	1.46	22.25	12.66	
Celery Seed.....P	11795	6.32	.....	1.28	11.18	22.07	Adulterated with fine sand.
Celery Seed.....P	12407	25.65	.....	2.10	26.30	17.85	
Chamomile, Flowers, Belgian.....W	11603	22.58	.....	2.06	7.02	5.56	
Chimaphila.....G	12212	34.82 (49)	.....	.....	.....	5.30	
Chimaphila.....G	12842	36.11 (49)	.....	.....	.....	5.88	

TABULATION OF ASSAYS—(*Continued*)

SAMPLE	Sample No.	Alcohol extract Per cent.	Water extract, Per cent.	Ether extract Per cent.		Ash Per cent.	Remarks.
				Vol.	N. Vol.		
Cimicifuga.....G	12046	12.20	.....	.....	.....	9.30	
Cimicifuga.....G	13420	6.43	.....	.....	.....	8.93	
Cinnamon, Ceylon.....P	11863	14.33	.....	2.91	1.91	4.01	
Cloves.....G	11669	.....	.....	19.45	6.26	5.99	
Cloves.....P	12001	16.20	.....	12.90	6.85	5.50	
Colocynth Pulp.....P	11840	.....	.....	.....	.....	12.95	1.21 per cent. Petroleum ether
Colocynth Pulp.....P	11844	.....	.....	.....	.....	13.28	.59 per cent. Petroleum ether
Colocynth Pulp.....P	11947	.....	.....	.....	.....	14.15	1.12 per cent. Petroleum ether
Colocynth Apple.....G	12846	18.46 (49)	.....	.....	.....	4.73	8.24 per cent. Petroleum ether
Coltsfoot.....	13325	29.30	.....	.....	.....	9.30	
Condurango.....G	10379	12.90 (49)	.....	.....	.....	11.23	
Condurango.....G	12682	19.86 (49)	.....	.....	.....	8.10	
Cotton Root Bark.....W	11049	7.61	.....	.....	3.73	6.39	
Cotton Root Bark.....G	12094	5.30	.....	.....	3.75	5.20	
Cotton Root Bark.....G	12240	8.05	.....	.....	3.99	5.10	
Cubeb.....W	11055	9.70	.....	12.58	9.80	6.00	7.67 per cent. of stems and foreign substances.
Cubeb.....W	11056	10.34	.....	14.30	9.44	5.17	
Cubeb.....W	11154	11.04	.....	16.71	9.64	6.28	12.71 per cent. of stems.
Cubeb.....W	11155	9.68	.....	12.82	9.34	4.00	
Cubeb.....W	11167	8.87	.....	11.89	7.99	5.75	
Cubeb.....P	11346	9.35	.....	10.39	7.68	6.30	
Curcuma.....P	11164	9.91	.....	3.16	8.32	6.99	
Curcuma.....P	11165	8.12	.....	5.25	8.25	6.42	
Damiana.....G	13419	19.25 (65)	.....	.....	.....	18.91	Ash contained sand.
Damiana.....G	13267	21.41 (65)	.....	.....	.....	8.66	
(Dittany) Cretan.....W	13873	12.00	.....	0.25	5.70	12.95	24.5 per cent. unattached stem
Dogwood, Jamaica.....G	11670	16.64 (65)	.....	.....	.....	11.50	
Dogwood, Jamaica.....G	13119	10.37 (65)	.....	.....	.....	8.10	
Dogwood, Jamaica.....G	13685	9.63 (65)	.....	.....	.....	13.63	
Dragon's Blood.....P	11701	74.35	(Acid No. 27.9)	.....	72.90	8.71	Coloring properties fair.
Dragon's Blood.....P	12347	80.15	(Acid No. 3.3)	.....	82.40	4.45	Coloring properties very poor.
Dragon's Blood.....P	12427	77.05	(Acid No. 5.5)	.....	76.92	6.40	Coloring properties good.
Dragon's Blood.....P	13574	74.65	(Acid No. 61.6)	.....	82.80	.....	Contained rosin.
Dragon's Blood.....P	13575	65.55	(Acid No. 3.0)	.....	74.10	10.50	Coloring properties fair.
Elm Bark.....P	10961	.....	.....	.....	.....	8.10	
Elm Bark.....P	12112	.....	.....	.....	.....	9.30	
Euonymus.....G	13165	18.73 (78)	.....	.....	.....	7.70	

Eupatorium.....G	12665	22.80 (49)	.....	.....	.....	9.07	
Euphorbium.....P	11659	41.93	.....	.....	49.19	14.25	
Fenugreek.....P	12185	10.85	.....	0.50	5.57	3.15	
Frangula.....G	11428	24.50 (38)	.....	.....	.....	5.24	
Gamboge.....P	11703	76.36	.....	.....	.....	0.85	
Gelsemium.....G	13423	2.05	.....	.....	.....	0.38	
Gentian.....G	11321	40.88 (49)	34.86	.....	.....	3.40	
Gentian.....G	12403	33.40 (49)	34.40	.....	.....	3.30	
Gentian.....P	12404	37.70 (49)	38.50	.....	.....	3.45	
Gentian.....G	12653	34.13 (49)	34.36	.....	.....	3.38	
Ginger.....G	11381	3.83	.....	3.56	3.55	5.16	
Ginger, Jamaica.....P	11660	4.98	.....	1.95	2.79	3.30	
Ginger, Jamaica.....P	12405	5.50	.....	1.05	4.97	3.70	
Ginger, African.....G	12656	6.23	.....	1.62	5.31	4.90	
Ginger, African.....G	13683	6.20	.....	1.95	5.45	4.75	
Glycyrrhiza.....G	11202	.....	.....	.....	.....	8.49	Alk. Aqueous Extract 29.1 per cent.
Glycyrrhiza.....P	11601	.....	16.50	.....	.....	4.34	Alk. Aqueous Extract 30.0 per cent.
Glycyrrhiza.....P	11602	.....	23.36	.....	.....	4.50	Alk. Aqueous Extract 30.4 per cent.
Glycyrrhiza.....G	11656	.....	16.80	.....	.....	8.60	Alk. Aqueous Extract 26.8 per cent.
Glycyrrhiza.....G	12813	.....	15.78	.....	.....	6.45	Alk. Aqueous Extract 25.8 per cent.
Guaiac.....W	11633	76.80	.....	.....	.....	4.00	
Guaiac.....P	12479	70.06	.....	.....	.....	4.61	
Guaiacum Wood.....G	13389	23.40 (70)	.....	.....	.....	0.90	
Hellebore, Black.....G	10962	27.90 (70)	.....	.....	.....	17.88	
Hellebore, Black.....G	13581	31.45 (70)	.....	.....	.....	13.01	Alk. 0.056 per cent.
Hellebore, White.....P	13773	.....	.....	.....	.....	12.15	Alk. 1.030 per cent.
Hellebore, White.....P	13829	.....	.....	.....	.....	16.10	Alk. 0.836 per cent.
Helonias Dioica.....G	12784	28.19 (49)	.....	.....	.....	7.70	
Helonias Dioica.....G	12785	28.07 (49)	.....	.....	.....	3.60	
Helonias Dioica.....G	13074	31.36 (49)	.....	.....	.....	5.97	
Hops.....G	11429	31.41 (49)	.....	1.85	17.19	8.10	
Hops.....G	12371	34.53 (49)	.....	1.68	17.71	8.08	
Hops.....G	13684	29.40 (49)	.....	0.72	12.45	13.01	
Hydrangea.....G	13148	13.63 (49)	.....	.....	.....	8.35	
Insect Powder.....	11565	10.71	.....	.....	4.43	4.83	Contained few pollen grains.
Insect Powder.....	11566	11.49	.....	.....	6.79	4.93	Normal pollen grains.
Insect Powder.....	11567	9.39	.....	.....	3.71	5.78	Very few pollen grains.
Insect Powder.....	12361	14.05	.....	.....	7.95	5.85	Large amount of grains and woody matter.
Insect Powder.....	13585	12.25	.....	0.65	5.70	6.40	
Juniper Berries.....P	11700	40.15 (49)	.....	1.27	15.0	3.25	
Juniper Berries.....G	12777	28.12 (49)	.....	0.94	13.55	3.27	

TABULATION OF ASSAYS—(*Continued*)

SAMPLE	Sample No.	Alcohol extract Per cent.	Water extract, Per cent.	Ether extract Per cent.		Ash Per cent.	Remarks.
				Vol.	N. Vol.		
Kino.....W	11247	62.43	67.96	.....	.....	2.83	
Krameria.....G	13722	28.54 (49)	.....	.....	.....	1.35	
Lactucarium.....W	11245	44.21	27.82	4.45	47.33	6.71	
Lappa.....G	11768	24.90 (49)	.....	.....	.....	6.22	
Larkspur Seed.....W	11295	25.06	.....	13.49	30.58	6.55	2.06 per cent. of foreign substance.
Larkspur Seed.....W	11604	23.12	.....	.....	44.00	6.67	2.45 per cent. of foreign substance.
Larkspur Seed.....W	11841	19.52	.....	.....	34.14	6.53	1.66 per cent. of foreign substances.
Larkspur Seed.....P	12187	42.15	.....	3.42	39.98	6.25	
Larkspur Seed.....G	12787	44.75	.....	1.76	43.29	6.40	
Larkspur Seed.....W	12902	40.57	.....	.72	42.67	5.19	1.2 per cent. of foreign substance.
Lobelia.....G	11481	18.42 (49)	.....	.....	.....	8.15	
Lupulin.....P	10832	....	.....	.....	55.18	31.79	
Lupulin.....P	11082	.....	.....	.....	57.06	33.61	
Lupulin.....P	11828	.....	.....	.....	32.49	49.07	
Madder Root.....P	11779	19.77	27.06	.....	.....	20.02	
Madder Root.....P	11780	27.33	43.77	.....	.....	12.50	
Madder Root.....P	12138	24.80	23.90	.....	.....	28.70	
Madder Root.....P	13554	13.50	17.90	.....	.....	49.80	Contained sand.
Manna, Large Flakes.....	11586	99.45 (67)	.....	.....	.....	0.57	
Manna, Small Flakes.....	11587	98.21 (67)	.....	.....	.....	1.16	
Marrubium.....G	11758	18.16 (49)	.....	.....	.....	14.66	
Mastic.....W	11588	87.00	(Acid No. 53.78)	.....	98.38	0.29	
Mastic.....P	11639	86.69	(Acid No. 56.57)	.....	98.27	0.56	
Mastic.....W	11761	82.77	(Acid No. 58.50)	.....	98.26	0.15	
Mastic.....P	12680	91.20	(Acid No. 57.20)	.....	96.85	.....	
Mastic.....P	12933	81.10	(Acid No. 52.78)	.....	94.40	0.50	
Matico Leaves.....W	11998	15.70	.....	0.75	14.95	14.50	
Matico Leaves.....W	12322	16.50	.....	0.4	14.05	15.60	
Matico Leaves.....W	12833	10.80	.....	3.5	10.40	14.95	
Mullein.....G	12215	16.10 (49)	.....	.....	.....	15.28	
Mustard, Black.....P	10925	.....	.....	.....	15.60	5.04	
Mustard, Black.....P	11278	.....	.....	0.46	17.34	5.28	
Mustard, Black.....P	11369	.....	.....	0.96	23.47	4.77	
Mustard, Black.....P	11980	.. ..	.....	0.45	27.80	4.70	

Myrrh.....W	12211	21.20	.....	.90	19.85	7.70	
Myrrh.....P	12366	26.00	.....	.....	.....	9.80	
Myrrh.....W	13698	10.99	.....	.....	.....	11.28	Poor quality.
Nutgall.....P	12264	72.95	.....	.....	.....	1.90	
Nutmeg.....G	11655	14.35	.....	3.27	40.97	2.00	
Olibanum.....P	11647	69.54	(Acid No. 30.6)	.....	.....	3.25	
Olibanum.....P	12435	70.40	(Acid No. 33.4)	.....	.....	2.55	
Olibanum.....P	13706	58.93	(Acid No. 36.9)	.....	.....	6.85	
Orris Root.....P	11143	.....	.....	0.24	4.10	1.58	
Pareira.....G	11518	6.03 (58)	.....	.....	.....	1.98	
Pepper, White.....P	11085	8.60	.....	0.15	8.20	1.11	
Phytolacca Root.....G	11768	23.78 (49)	.....	.....	.....	13.12	
Phytolacca Root.....G	13207	24.00 (49)	.....	.....	.....	10.06	
Phytolacca Root.....G	13562	19.95 (49)	.....	.....	.....	10.49	
Pulsatilla.....G	13120	24.75 (49)	.....	.....	.....	8.22	
Quassia.....G	11517	3.45 (32)	.....	.....	.....	2.78	
Quassia.....P	12466	6.34 (32)	.....	.....	.....	3.08	
Queen of the Meadow.....G	13205	23.42 (49)	.....	.....	.....	10.16	
Quillaja.....P	10881	16.37	41.74	.....	.....	12.73	
Quillaja Cut.....	11578	31.06 (49)	.....	.....	.....	7.59	
Quillaja Cut.....	11756	23.09	.....	.....	.....	8.10	
Quillaja.....G	12507	20.68 (49)	.....	.....	.....	6.14	
Red Gum.....P	13735	92.52 (90)	2.04	.....	.....	2.53	
Resin of Podophyllum.....	11323	96.85	6.58	.....	77.84	0.33	$CHCL_3$ sol==64.38 per cent.
Rhubarb.....P	10964	37.70 (78)	(Alcohol Extract 43.00 per cent. (49)	.....	.....	7.72	
Rhubarb.....G	11322	38.38 (78)	(Alcohol Extract 41.30 per cent. (49)	.....	.....	8.27	
Rhubarb.....G	12129	41.00 (78)	.....	.....	.....	7.90	
Rhubarb.....P	12140	44.45 (78)	.....	.....	.....	7.90	
Rhubarb.....P	12184	44.00 (78)	.....	.....	.....	7.80	
Rhubarb.....P	12361	43.60 (78)	.....	.....	.....	7.80	
Rhubarb.....G	12778	38.90 (78)	.....	.....	.....	5.28	
Rhubarb.....G	13563	44.10 (78)	.....	.....	.....	8.60	
Rosemary Leaves.....W	11904	21.70	.....	1.00	16.70	6.50	5 per cent. stems and foreign matter.
Sabadilla Seed.....P	12319	.....	.....	.....	.....	10.40	4.31 per cent. alkaloids.
Sabadilla Seed.....W	12320	.....	.....	.....	.....	4.45	4.66 per cent. alkaloids.
Sabadilla Seed.....P	12427	.....	.....	.....	.....	6.75	4.66 per cent. alkaloids.
Sabadilla Seed.....P	13476	.....	.....	.....	.....	14.00	4.55 per cent. alkaloids.
Sabadilla Seed.....P	13482	.....	.....	.....	.....	4.60	4.61 per cent. alkaloids
Safflower.....W	12513	.....	45.30	.....	.....	11.75	
Saffron, Spanish.....W	11009	.....	77.73	.....	.....	4.51	3.36 per cent. unattached styles.
Saffron, Spanish.....W	11010	.....	81.00	.....	.....	5.52	5.49 per cent. unattached styles.
Saffron, Spanish.....W	11338	.....	68.32	.....	.....	4.76	10.95 per cent. unattached styles.

TABULATION OF ASSAYS.—*Continued.*

SAMPLE	Sample No.	Alcohol extract Per cent.	Water extract, Per cent.	Ether extract Per cent.		Ash Per cent.	Remarks.
				Vol.	N. Vol.		
Saffron, Spanish.....W	11454	.....	64.42	.....	.....	5.14	6.19 per cent. unattached styles.
Saffron, Spanish.....W	11490	.....	69.27	.....	.....	4.51	21.75 per cent. unattached styles.
Saffron, Spanish.....W	11491	.....	71.56	.....	.....	4.25	24.23 per cent. unattached styles.
Saffron, Spanish.....W	11492	.....	64.00	.....	.....	5.02	7.75 per cent. unattached styles.
Saffron, Spanish.....W	11978	.....	73.00	.....	.....	4.00	1.60 per cent unattached styles.
Saffron, Spanish.....W	12419	.....	69.70	.....	.....	5.64	6.50 per cent. unattached styles.
Sandalwood.....G	13026	6.95 (70)	.....	.....	.....	5.58	
Sandalwood.....G	13431	5.86 (95)	(Alcohol Extract 4.27 per cent. (70)	.....	.....	5.41	
Santonica.....W	11944	22.30	.....	4.10	15.75	8.50	25 per cent. stems and foreign substances.
Santonica.....W	12063	25.10	.....	4.90	14.35	10.25	21 per cent. foreign substances.
Santonica.....W	12064	22.90	.....	5.00	13.55	8.75	32 per cent. stems and foreign substances.
Sarsaparilla.....G	11970	17.90 (32)	.....	.....	.....	12.60	
Sarsaparilla.....G	13566	15.75 (32)	.....	.....	.....	13.99	
Sassafras.....G	11200	13.06 (70)	.....	0.30	3.14	29.15	
Sassafras.....W	11228	20.72 (70)	.....	0.68	3.80	12.92	
Sassafras.....W	11229	17.35 (70)	.....	0.53	2.22	40.57	
Sassafras.....W	11230	16.08 (70)	.....	0.44	2.65	24.07	
Sassafras.....G	11551	19.84 (70)	.....	0.97	2.42	17.57	
Sassafras.....W	13874	33.75 (70)	.....	0.57	3.83	5.47	
Saw Palmetto.....G	13422	20.26	.....	.....	.....	30.5	
Scoparius.....G	13206	24.10 (49)	.....	.....	.....	2.95	
Senega.....G	11446	33.22 (63)	.....	.....	6.23	6.74	
Senega.....G	9739	37.96 (63)	.....	.....	8.48	6.04	
Senega.....G	12392	33.75 (63)	.....	.....	8.68	3.98	
Senega.....G	12911	30.56 (63)	.....	.....	.....	6.26	
Senega.....G	13682	34.62 (63)	.....	.....	.....	6.57	
Senna, Alexandria.....W	10826	.....	27.39	.....	.....	20.40	
Senna, Alexandria.....G	11808	31.72 (49)	.....	.....	.....	10.53	

Senna, Alexandria.....G	11809	29.50 (49)	.....	.....	.....	10.50	
Senna, Alexandria Sifting..	12347	12.60 (49)	31.10	.....	.....	9.42	
Senna, Alexandria.....G	12579	31.36 (49)	30.78	.....	.....	9.00	
Squaw Vine.....G	12782	20.35 (49)	.....	.....	.....	11.43	
Squaw Vine.....G	13078	25.06 (49)	.....	.....	.....	6.93	
Squill Cut.....	13283	.....	79.05	.....	.....	2.40	Acetic Extract 79.25 per cent.
Staphisagria.....G	13221	25.85	.....	.40	27.30	21.80	
Stillingia.....G	9952	14.32 (49)	.....	.....	.....	6.72	
Stillingia.....G	11654	11.32 (49)	.....	.....	.....	4.05	
Stillingia.....G	12383	11.99 (49)	.....	.....	2.75	5.37	
Stillingia.....G	13078	13.58 (49)	.....	.....	.....	4.55	
Sumach Berries.....G	11480	10.59 (49)	.....	.....	.....	2.09	
Sumbul.....G	10937	20.23 (70)	.....	.....	6.48	4.72	$CHCl_3$ Extract=8.34.
Taraxacum.....G	11382	32.14 (49)	.....	.....	.....	11.40	
Taraxacum.....G	12709	37.96 (49)	48.62	.....	.....	8.37	
Triticum Cut.....	11607	.....	39.79	.....	.....	3.92	
Uva Ursi.....W	10457	33.21 (30)	.....	.....	.....	4.15	
Uva Ursi.....G	12957	35.06 (20)	.....	.....	.....	2.91	
Valerian.....W	11575	22.32 (49)	.....	1.90	2.08	16.46	
Valerian.....G	12038	18.50 (73)	.....	0.50	1.70	21.70	
Valerian.....P	12467	19.69 (73)	.....	0.76	3.30	22.86	
Valerian.....G	13390	18.40 (76)	.....	0.25	2.70	26.40	
Verbascum Flowers.....W	11579	35.60	.....	0.38	2.68	3.95	
Viburnum Opulus.....G	11522	20.96 (65)	.....	.....	.....	3.89	
Viburnum Opulus.....G	12781	20.40 (65)	.....	.....	.....	3.10	
Viburnum Opulus.....G	13076	22.30 (65)	.....	.....	.....	3.39	
Viburnum Prunifolium.....G	9953	16.88 (65)	.....	.....	.....	9.01	
Viburnum Prunifolium.....G	10923	17.48 (65)	.....	.....	.....	4.43	
Viburnum Prunifolium.....G	12780	23.12 (65)	.....	.....	.....	4.40	
Viburnum Prunifolium.....G	13118	23.15 (65)	.....	.....	.....	4.80	
Wild Yam.....G	11724	18.32 (49)	.....	.....	.....	3.84	
Wintergreen.....G	10499	16.38 (70)	.....	.....	.....	3.44	
Wintergreen.....G	12476	25.64 (70)	.....	1.18	5.55	2.74	
Zanthoxylum.....G	13166	23.28 (65)	.....	.....	.....	6.80	
Zanthoxylum.....W	13478	15.35	.....	0.25	10.75	4.80	Southern Bark.
Zanthoxylum.....W	13479	18.65	.....	0.25	10.35	5.40	Northern Bark.
Zanthoxylum.....W	13480	18.22	.....	1.20	12.90	7.50	Northern Bark.
Zanthoxylum.....W	13481	14.90	.....	0.10	9.65	5.60	Northern Bark.

The methods for assaying the drugs reported in this paper are essentially the same as previously given.

For further particulars the reader is referred to the first paper appearing in the October, 1912, number of this JOURNAL.

The results of the assays are given in the table on pp. 436–443.

Abbreviations, etc.: W.—Whole drug; P.—Powdered drug; G.—Ground drug. Where the alcoholic menstruum used in determining the anhydrous alcohol extract was of a percentage other than 95 per cent. absolute alcohol, the percentage is indicated by the figure in brackets; for example, 20.3 (49), 32.6 (63) indicating 49 and 63 per cent. absolute alcohol, respectively.

Agar-Agar—Four samples contained ash 8.23, 4.8, 4.5 and 4.4 per cent. respectively.

Gambir—Fifteen samples: Alcohol Extract—Minimum 63.30 per cent., maximum 87.00 per cent., average 78.6 per cent. Aqueous Extract—Minimum 61.7 per cent., maximum 82.75 per cent., average 77.95 per cent. Ash—Minimum 3.40 per cent., maximum 8.48 per cent., average 5.55 per cent.

Ipecac—Eight samples: Ash minimum 3.40 per cent., maximum 4.63 per cent., average 4.10 per cent.

Jalap—Seven samples: Ash minimum 0.62 per cent., maximum 1.77 per cent., average 1.29 per cent.

Lycopodium—One sample contained 8.61 per cent. ash, which was chiefly calcium carbonate.

Salep—One sample ash 2.24 per cent.

Taraxacum—One sample submitted consisted of approximately 50 per cent. chicory.

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THE DETECTION OF EMODIN-BEARING DRUGS IN PRESENCE OF PHENOLPHTHALEIN.

By L. E. WARREN.

Phenolphthalein, either alone or in mixture with other drugs, is a constituent of a number of nostrums which are sold as laxatives. The separation and identification of phenolphthalein in medicines is usually accomplished readily, but its presence may interfere with the

identification of other drugs. This is likely to be the case with cascara, senna, and other emodin-bearing drugs. Ordinarily the emodin-bearing drugs as a class would be detected by shaking the faintly acidified extracts with benzol and washing the solvent first with water, which is discarded, and then with very dilute ammonia water.[1] In presence of emodin the ammoniacal layer becomes red, the depth of color and shade depending somewhat upon the amount of emodin present and the source of the drug from which obtained. This test cannot be used in presence of phenolphthalein because this substance behaves like emodin. This holds true in spite of the great insolubility of phenolphthalein in water,[2] for if a solution containing this substance be acidified, diluted with several times its volume of water and filtered, the filtrate will become strongly colored purplish-red on the addition of ammonia water or of potassium hydroxide or sodium hydroxide solution. Or if the acid filtrate be shaken with benzol, the aqueous layer discarded, and the solvent washed with either of these alkaline solutions, the purplish-red color appears at once. Unless the quantity of phenolphthalein be very small the color produced by it with the alkalies will hide or obscure that of any emodin alkali compounds that may be present.

Under certain conditions, however, the color produced by phenolphthalein and an excess of the fixed alkali hydroxides gradually disappears, owing to the formation of the trimetallic salt of phenol-

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[1] Bornträger: *Z. anal Chem., 19,* 165 (1880).

[2] According to McCoy (*Am. Chem. Jour., 31,* 503, 1904), the maximum solubility of phenolphthalein in water is approximately a ten-thousandth-normal solution. This is equivalent to about 0.0032 Gm. of the substance in 100 c.c. This conclusion was reached after approximate determinations had been carried out by two methods. In one 0.0318 Gm. of purified phenolphthalein was boiled with 1200 c.c. of water. On cooling no deposit formed, indicating a solubility greater than twelve-thousandth-normal. In the other known amounts of tenth-normal phenolphthalein (in alcohol) were added to 100 c.c. of five-hundredth-normal ammonia water and the solution neutralized by the addition of 2 c.c. of tenth-normal hydrochloric acid. With 0.5 c.c. of the phenolphthalein solution the resultant solution contained a precipitate of phenolphthalein; with 0.3 c.c. the solution was turbid; with 0.2 c.c. faintly turbid; and with 0.1 c.c. clear, although a slight deposit formed on standing over night. This indicated a solubility of about ten-thousandth-normal, corresponding to 0.00318 Gm. per 100 c.c. On the other hand, Zotier (*Bull. soc. chim.* [4], 7, 993, 1910), from an average of thirty determinations (method not stated), gives the solubility of phenolphthalein in water as about 0.0092 Gm. in 100 c.c.

phthalein, leaving the solution colorless. On the other hand, the color of the alkali compounds with emodin is more stable, sometimes lasting for several days.* An attempt was made to differentiate by this test between phenolphthalein and emodin when in mixture, but the results were not very satisfactory. If applied to a mixture of phenolphthalein and an extract of an emodin-bearing drug, obtained by extraction with alcohol and evaporation of the solvent, the extracted coloring matter renders the test worthless. If applied to a benzol, chloroform, or ether extract, the confusion of colors renders positive identification doubtful. However, if the red color of the strongly alkaline solution disappears the test is a valuable confirmation of the absence of most of the emodin-bearing drugs. If the color persists after standing for several hours, the presence of an emodin-bearing drug is presumptive. A method seemed desirable by which the phenolphthalein might be removed from such mixtures, thus leaving the emodin free to be tested for in the usual way. Of the several methods used for its quantitative determination, that proposed by Kollo,[3] by which the substance is precipitated as tetraiodophenolphthalein,[4] seemed the most promising.

Some tests were first made with a preparation known to contain phenolphthalein (most of which was in suspension) and an emodin-bearing drug extract.

The following method was used:

The preparation, which was in the form of a syrup, was diluted with water, faintly acidified and filtered to remove most of the phenolphthalein. The filtrate was neutralized with ammonia water, evaporated to a very thick syrup, and the warm syrup extracted with acetone (which had been rendered slightly acid by hydrochloric acid) by stirring with successive small portions of the solvent and decanting from the residue. In this case acetone was found a more suitable solvent than either chloroform or ether, as it formed less troublesome emulsions. In preparations that do not form emulsions ether extracts are more satisfactory for the subsequent manipulations. The acetone fractions were united, evaporated to dryness on the water-bath, the

* Experiments have shown that if ether extracts from small amounts of rhubarb be heated on the water-bath for three hours with 50 per cent. sodium hydroxide solution the red color is not destroyed.

[3] *Ap. Ztg.*, *24*, 283 (1909).

[4] Tetraiodophenolphthalein was first described by Classen and Loeb (*Ber.*, *28*, 1603, 1895).

residue twice moistened with alcohol and evaporated in order to remove the last trace of acetone. The residue was taken up in diluted sodium hydroxide solution, the solution filtered, and a slight excess of iodine test solution added, followed, after a few minutes, by a slight excess of hydrochloric acid. The container was cooled for an hour in a water-bath having a temperature below 15° C. and the contents filtered. By this treatment the phenolphthalein was precipitated as tetraiodophenolphthalein, a substance which is very insoluble in water. The precipitate on the filter was washed with water several times, a yellow solution being produced. The filtrate and washings were united, the solution treated with a slight excess of sodium sulphite to remove free iodine, and the solution shaken with chloroform. The chloroform was evaporated and the residue treated with dilute solution of sodium hydroxide. By this treatment the anthracene purgatives give red colors which vary in shade, depending somewhat upon the source of the emodin. Preparations containing phenolphthalein alone give no red color, or at most a faint purplish-red, which soon fades if a considerable excess of the alkali be added.

Briefly stated, the method consists in treating an acetone or ether extract of the substance with sodium hydroxide solution, adding iodine solution, followed by hydrochloric acid, removing the tetraiodophenolphthalein by filtration after standing, shaking out the filtrate with chloroform after adding a sulphite to remove excess of iodine, evaporating the chloroform, and treating the residue with sodium hydroxide solution.

As controls the test was carried out with the fluidextracts of cascara and rhubarb, a mixture of the fluidextracts of senna and licorice, a trade preparation stated to contain senna, a mixture containing aloes and phenolphthalein, and a trade preparation claimed to be a form of bitterless cascara. The residue from the fluidextract of cascara gave a dark red color with a faint brownish tinge, that from rhubarb a deep red with a suggestion of purplish, that from the senna-licorice mixture a somewhat lighter red with a faint suggestion of yellowish (the licorice did not interfere), that from senna alone a color similar to that from the mixed senna and licorice, that from the aloes and phenolphthalein a faint reddish-yellow, and that from the bitterless cascara preparation a color similar to that given by the fluidextract of cascara. The test with aloes was carried out several times, but with results that were not entirely satisfactory. The colors given for the several drug residues do not differ from each

other sufficiently to positively identify the source of the drug, yet they should prove of considerale value as confirmatory evidence. The light red from senna would not ordinarily be mistaken for the deeper red of cascara or of rhubarb, nor the faint reddish-yellow of aloes for any of the others, particularly if controls be carried out. In some instances, on standing, a reddish, flocculent precipitate was formed in the alkaline solutions as finally obtained. On its removal by filtration the filtrate became lighter in color. In the test with the aloes-phenolphthalein mixtures the filtrate became of a reddish-yellow color. On the whole the test is much less satisfactory for aloes than for the other drugs tested.

While these experiments were in progress Bailey [5] published a method of distinguishing chrysophanic acid of rhubarb from phenolphthalein. By his method the dealcoholized, faintly acidified preparation is shaken with ether, and the solvent layer washed with very dilute ammonia water. The alkaline solution is allowed to stand over night, by which the colored compounds of hæmatoxylon and curcuma, if present, fade. The solution is then acidified and shaken with ether. Only chrysophanic acid and phenolphthalein pass into the solvent. The ether is evaporated and the residue boiled with zinc dust and potassium hydroxide solution until the red color has entirely disappeared. By this treatment chrysophanic acid is reduced, the solution becoming yellowish, and phenolphthalein is reduced to phenolphthalin. The solution is diluted with water, or a drop of hydrogen peroxide solution is added. A cherry-red color appearing at once indicates chrysophanic acid. Under these conditions phenolphthalin is not oxidized.

Bailey did not apply his method to cascara or to aloes, but implies that it might be used on senna preparations. We have applied the method to the fluidextracts of senna and cascara, to each of which some alcoholic solution of phenolphthalein had been added. In each case the result was satisfactory. It was found necessary to boil the alkaline zinc-dust mixture for some time in order to completely destroy the red color. It was also found that exposure of the boiled solution to the air, as in filtration, was generally sufficient to restore the color to the substance. When the test was applied to Barbadoes aloes the red color given on the addition of hydrogen peroxide solution was slow to appear and was masked considerably by yellow coloring matters. To the limited extent that comparison tests have been

[5] *Jour. Ind. Eng. Chem.*, *6*, 320 (1914).

carried out it does not appear that either method has any marked advantage over the other. If hæmatoxylon or curcuma be present, results may be obtained more quickly by the proposed iodine method, since the colors from these substances are destroyed (or removed) by the iodine treatment, hence it is unnecessary to wait over night for the destruction of the coloring matters by treatment with ammonia.

Summary.—The presence of phenolphthalein in medicines interferes with the detection of the emodin-bearing drugs.

Phenolphthalein may be removed by treating the ether (or acetone) extract with sodium hydroxide and iodine solutions, adding hydrochloric acid and filtering.

After removal of the phenolphthalein the emodin may be detected in the usual way, using a fixed alkali hydroxide for its solution.

The method was tried on several emodin-bearing drugs and gave satisfaction, except in the case of aloes.

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RED GUM.

By John K. Thum, Pharmacist at German Hospital, Philadelphia.

Eucalyptus rostrata yields the extract Australian Kino, and more popularly known by the name "Red Gum." The latter is found on the market, pharmaceutically, in the form of troches and in a fluid form, misleadingly termed by the manufacturers a fluidextract.

Like Kino of the U. S. P., it contains considerable tannin, which makes it extremely valuable as an astringent. The so-called fluidextract has obtained some vogue among throat specialists as a local application in place of the well-known Glyceritum Tannin, it being much more agreeable and pleasant to the patient, and just as efficient as the latter preparation.

While all the manufacturers who market a fluid form of red gum have it listed in their price lists as a fluidextract, some have an asterisk placed alongside the word, and on referring to the footnote one finds these words: "those fluids which do not represent the crude drug, minim for grain"; which is a tacit confession that it is impossible to make a 100 per cent. solution of this drug.

On looking over the literature relating to this drug—and the literature, by the way, is scant—one is informed that it is soluble in cold water to the extent of 80 to 90 per cent. This is wrong. It is

extremely doubtful if as much as 30 per cent. is soluble in cold or even boiling water. My experience leads me to believe that less than 20 per cent. of the drug is soluble in boiling water, and that it refuses to remain in solution without the addition of varying amounts of glycerin; without this addition gelatinization always results. My experience also showed that the use of alcohol in effecting solution is unnecessary, or at least less effective than a menstruum consisting of water and glycerin. Heat must be used. I found that after shaking 20 parts of the powdered drug with 80 parts of cold water, at intervals, for twelve hours, two parts of drug remained in solution. By heating in a flask on a water-bath for 15 minutes and frequently shaking, about 10 per cent. is dissolved. Unfortunately, after a few days a jelly-like mass results. This, however, as mentioned above, can readily be overcome, or rather avoided, by the addition of glycerin or, better still, by heating on a water-bath with equal parts of glycerin and water.

After more or less experimentation, which I need not recount here, I evolved the following formula and method of procedure, which seems to meet all the requirements of those physicians who wish to use red gum as a local application:

Red Gum, powdered	200 Gm.
Glycerin	250 Cc.
Water, a sufficient quantity to make..	1000 Cc.

Mix the glycerin with five hundred cubic centimetres of water, and triturate the powdered red gum with sufficient of the mixture to produce a smooth paste. Transfer this to a flask by the aid of the remainder of the mixture of glycerin and water and heat on a water-bath for one hour; filter through purified cotton, keeping the funnel well covered. Finally, pass sufficient water through the filter to obtain one thousand cubic centimetres of fluid.

ANALYSES OF TWO ECHINACEA ROOTS.

By F. W. Heyl and J. F. Staley.

A review of the literature indicates that a further chemical study of Echinacea, particularly of *Brauneria angustifolia,* might be of some value in offering evidence concerning the conflicting views concerning the pharmaceutical value of this plant.

This root has been stated [1] to contain minute quantities of an inactive alkaloid. Its supposed medicinal activity is ascribed to the presence of a resin. Lastly, in describing the pharmacognosy of Echinacea,[2] Henry Kraemer and Maud Sollenberger have found inulin.

Despite the unfavorable report of the American Medical Association, Council on Pharmacy and Chemistry,[3] this plant is used to some extent, and a review of the meagre chemical literature indicates that more experimental evidence is required before forming a conclusion concerning its value pharmaceutically.

In this brief paper we report the results of the proximate analyses of two species, and further work is in progress upon the more important *Brauneria angustifolia*. The sample of *Brauneria purpurea* was obtained upon the market as a sample of Echinacea.

Experimental.

The material for this investigation consisted of the roots of two species of the genus *Brauneria* (*Echinacea*) of the family Compositæ, (a) *Brauneria angustifolia* (*D. C.*) Heller, the narrow-leaved purple cone flower, and (b) *Brauneria purpurea* (*D. C.*) Britton, the purple cone flower.

The *Echinacea* of the U S. Dispensatory,[4] in so far as it applies to "*Brauneria pallida* (Nutt.) Britton," is a confusion of two species. The "*Echinacea angustifolia* D. C." there considered a synonym of the above (*B. pallida*) is now known to be a separate and distinct species, *Brauneria angustifolia* (*D. C.*) Heller, and has from our observations furnished most of the Echinacea of the market. It is this species which furnishes the principal material under investigation. The recognition of this confusion leaves *Brauneria pallida* (*Nutt.*) Britton as a species of good standing.[5]

The roots of *Brauneria angustifolia* were collected for us in the rough gravelly prairie land of north central Kansas. The *Brauneria purpurea* was said to have been collected in Missouri.

The roots of *Brauneria angustifolia* were received at the labora-

[1] C. G. Lloyd, *Eclec. Med. Journal* (1897).

[2] American Journal Pharmacy, 83, 315 (1911).

[3] *Journal A. M. A.*, vol. 53, 1836 (1909).

[4] U. S. Dispensatory, p. 1476 (19th Ed.).

[5] Robinson, B. L., and Fernald, M. L.: "Gray's New Manual of Botany," 1908, p. 832.

Britton, N. L., and Brown, A.: "Illustrated Flora," 1913, p. 476.

tory in the green condition, and after careful identification by Dr. L. H. Harvey, to whom we are indebted for the botanical work, were ground while still fresh. A large quantity of this material was transferred to percolators and exhausted with 95 per cent. alcohol, as will be described later.

A small sample was air-dried, and then ground and sieved. This was used for the proximate analyses. The *Brauneria purpurea* was received in the air-dried condition and ground and sieved by us.

The roots were quantitatively extracted, with the following results:

Extract.	*B. angustifolia.*	*B. purpurea.*
Ligroin (35°–55°)	0.77	0.93
Ether (110°)	1.26– 1.18	1.61
Alcohol (110°)	19.70–19.94	18.28

The proximate analyses were conducted in accordance with the usual [6] methods, and gave the results tabulated in the following table:

	B. angustifolia.	*B. purpurea.*
Moisture	10.90	10.18
Starch	Absent	Absent
Pentosans	15.6 15.1	15.6
Crude Fiber	24.77, 24.46	29.65, 29.51
Protein	6.54, 6.96	5.31, 5.17
Ash	7.76	6.93

The residues left after extracting with alcohol were next digested with cold water, for the purpose of ascertaining if any dextrin-like substances were present. The residue left after extracting ten grammes of the root of *B. angustifolia* with alcohol, when digested with cold water yielded considerable soluble material. The aqueous extract was quantitatively made to a volume of 20 c.c. (2 c.c. = 1.0 gramme root). Four cubic centimetres of this was diluted to 50 c.c., and 25 c.c. of this solution showed no reducing action on Fehling's solution. The other 25 c.c. was hydrolyzed with hydrochloric acid, whereupon it showed the presence of 0.0682 Gm. lævulose, equivalent to 6.14 per cent. of "inuloid-like" material.

The remainder of the original aqueous solution (16 c.c.) was made up to a volume of 18 c.c. with lead subacetate. A heavy precipitate was removed by filtration. This filtrate then has a concentration of 0.4445 Gm. of the root per cubic centimetre. It showed a rotation of – 2.3°, Ventzke in a 1 dcm. tube. Assuming a specific rota-

[6] U. S. Dept. Agr. Bur. of Chem. Bull. 107 (Revised).

tion of $-32.46°$, which is that recorded [7] for "sinistrin," this would represent 5.55 per cent. of the plant. The solution, freed from lead and hydrolyzed, showed the presence of a quantity of lævulose equivalent to 5.94 per cent. "inuloid-like material," indicating the non-carbohydrate nature of the lead subacetate precipitate.

Inulin was determined by the method of Dragendorff [8] wherein the plant is extracted with water 55° to 60° and the inulin precipitated with three volumes of alcohol. The inulin was determined by determining the lævulose formed when this precipitate was hydrolyzed. A correction of 0.1 gm. per 100 c.c. of the volume of the filtrate was made for the solubility of the inulin. Whether or not this inulin precipitate included any of the material determined as "inuloid" was not established. The following table gives the results of the various estimations of alcohol insoluble carbohydrates:

	B. angustifolia.	*B. purpurea.*
Inulin	5.9%	not determined
Inuloid[9]	5.94, 6.14%	9.16%

Determination of the Alcohol Soluble Carbohydrates by Polariscopic methods.—One hundred grammes of *B. angustifolia* were completely extracted with hot alcohol. The combined alcoholic extracts were concentrated under diminished pressure to a volume of 200 c.c. An aliquot of this solution, equivalent to 74 grammes of the root, after the complete removal of the alcohol, was taken up in water, clarified with an excess of lead subacetate, and made up to a volume of 100 c.c. This solution showed a rotation of $-2.2°$ in a 2 dcm. tube at 22° C.

Fifty cubic centimetres of the filtrate from the lead subacetate precipitation was freed from the lead and inverted by standing with 5 c.c. hydrochloric acid for 24 hours. The solution was neutralized and made up to 100 c.c. It showed a rotation of $-13.25°$ in a 2 dcm. tube at 22° C., and of $-6.8°$ at 86° C. in a 2 dcm. tube. These readings are on the Ventzke scale.

Converting these readings to the calculated rotations of a normal solution (26 Gm. in 100 c.c.), we have: direct reading at 22° C. of $-0.77°$; invert at 22° C. of $-9.31°$; and invert reading at 86° C. of $-4.78°$. The percentage of sucrose calculated by Clerget's formula

[7] Dragendorff, "Plant Analysis," p. 67.
[8] "Plant Analysis," p. 87.
[9] "Biochem. Handlexikon," 2, 189.

is 6.5 per cent. The percentage of lævulose calculated on the basis of the change in rotation of the inverted solution due to change in temperature is 3.99 per cent.[10]

The following table includes the results of the quantitative work carried out upon the alcohol extract, which was examined for sucrose and hexose sugars, and for resin (insoluble in water):

	B. angustifolia.	*B. purpurea.*
Resin	1.84	2.00
Sucrose	6.92	3.40
Reducing sugars	3.65, 3.52, 3.80	3.41

The roots were examined for alkaloids. Of each species we used duplicate ten-gramme samples for assay. When examined by the method which is official for belladonna root,[11] residues were obtained from *B. angustifolia* weighing 0.0054 and 0.0077 gramme. From *B. purpurea* the weights found were 0.0086 and 0.0063 gramme. These residues were not alkaloidal, as they failed to neutralize any N/50 acid, and the slightly acid solutions gave no precipitate with Mayer's reagent.

In order to affirm this point 200 grammes of *Brauneria angustifolia* were exhausted with Prollius'[12] solution by percolation. The percolate was thoroughly extracted with several portions of dilute sulphuric acid, and from this acid solution we were able to obtain neither an alkaloidal extract nor even a precipitation test with Mayer's reagent. We conclude, therefore, that no alkaloid sufficiently basic to be extracted by the ordinary methods is present in this drug. This, however, does not exclude the possibility of the presence of choline or allied substances. The recent work of Power and Browning[13] in isolating choline from dandelion root makes this a possibility worthy of note. *Brauneria purpurea* was not further studied in this connection.

Volatile Oil in B. angustifolia.—A portion of the fresh roots equivalent to 3.7 kilogrammes air dried was distilled with steam until the distillate was free from volatile oil. The first runnings were very slightly turbid and carried the odor characteristic of the drug. The

[10] "Commercial Organic Analysis," Allen, vol. 1, p. 356 (1908). The observed rotations of the normal solution are about 1.5° to the left greater than those calculated for a mixture of lævulose and sucrose.

[11] U. S. Disp., 19th Ed., p. 228.

[12] Alcohol 8 c.c., ether 88 c.c., ammonia (10 per cent.) 4 c.c.

[13] *J. Chem. Soc.*, 101, 2411 (1912).

oil separated in the usual manner weighed 1.4 Gm. It was amber colored and had a powerful odor. This is equivalent to 0.04 per cent. of the air-dried drug.

The resin, to which the medicinal properties are ascribed, was prepared from a quantity of the fresh drug, corresponding to 33.3 kilogrammes of air-dried drug. This drug was exhausted by percolation with alcohol, the percolate (260 litres) was concentrated by distillation under diminished pressure to a volume of 11.5 litres. This concentrated alcoholic solution, from which a fatty layer separated in considerable quantity, was mixed with about 20 litres of distilled water, whereupon the precipitation of the resin was complete. After continued agitation for the purpose of thoroughly washing the resin, and long standing, the resin separated above a clear, reddish-brown aqueous layer. By siphoning, most of the aqueous layer could be separated from the resin. It was noticed that a very slight intermediate zone between the resin layer and the aqueous layer contained crystalline material. This was separated by mechanical means and in very small quantity, and crystallized from 95 per cent. alcohol. It proved to be an impure phytosterol, crystallizing in the characteristic laminæ, melting at about 131° to 136° indefinitely, and giving the usual color reactions. It was returned to the resin.

The resin was finally washed with water, taken up in alcohol, and then dried in a vacuum. The weight was 628 Gm., equivalent to 1.88 per cent. It is a brownish-yellow resin, and if dissolved in alcohol forms an amber-colored solution, which yields no crystalline deposit. It is possible, however, to obtain in the first fraction a *green* resinous deposit, which differs from the resin proper, which has the characteristic taste of the root. The material was brought into one fraction, taken up in purified sawdust, and extracted with the following results:

	Gramme.
Ligroin extract	222.0
Ether extract	107.0
Chloroform extract	180.0
Ethyl acetate extract	35.0
Alcohol extract	70.0
Total	614.0

We are studying these extracts as well as the water-soluble extract in more detail.

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PROPOSED U. S. P. IX LIMITATIONS FOR THE ASH CONTENT OF DRUGS.

By M. I. WILBERT, Washington, D. C.

The figures given in the second instalment of abstracts of proposed new descriptions and standards for the drugs of vegetable and animal origin to be included in the U. S. P. IX (*J. Am. Pharm. Assoc.*, 1914, vol. 3, pp. 359–416) suggest a comparison with other available data as a basis for comment and criticism. Among the newer pharmacopœias the German, Austrian, Swiss, and Dutch appear to include ash limitations more frequently than do any of the corresponding books of other countries, and these four books have been selected as being fairly representative of the general requirements made in European pharmacopœias.

The quotations designated " recent literature " are compilations of the maximum and minimum figures given by various authors referred to in recent numbers of the Hygienic Laboratory Bulletins, embodying the Digest of Comments on the Pharmacopœia of the United States of America and on the National Formulary, for the calendar years 1909 to 1912, inclusive. These figures suffice to indicate the probable extremes of the ash content of drugs found in commerce at the present time, and reflect actual conditions so far as these have been reported.

A casual survey of the figures presented in the appended table suggests that a few of the root drugs, like apocynum, cimicifuga, pyrethrum, and spigelia, are not sufficiently well known abroad to warrant their recognition. Other drugs, like sweet almonds, physostigma, musk, and vanilla, do not appear to vary sufficiently to justify systematic records being made of their ash content, or, as in the case of musk, more particularly, are so expensive that the determination of the ash content is not generally adopted as a means of determining the purity or quality of the drug.

Among the figures that may be considered as being comparatively low are those for asafœtida, ipecac, and vanilla. The first of these drugs frequently contains very much more foreign matter than would be permissible under the proposed limitations. This foreign matter is present to a considerable extent, at least, because of the methods employed in collecting asafœtida, and it is questionable, indeed,

whether the inclusion of earthly impurities is not preferable to the now frequently practised adulteration or even substitution of asafœtida by other gum resins which, while they serve to increase the alcohol soluble material and reduce the ash content of the drug as offered, are quite foreign to and do not contain any appreciable quantity of the odorous principles found in true asafœtida.

The maximum ash content permitted for ipecac appears to be somewhat low, certainly lower than is the maximum recognized in other pharmacopœias. The same is true of vanilla, and in connection with this drug there is some question as to whether the ash content limitation for the whole drug is really of value or is necessary.

The drugs for which the ash content limitation appears to be rather high are much more numerous and include aloes, cantharides, belladonna leaves, colocynth, coriander, gambir, glycyrrhiza, guaiac, linseed, lupulin, myrrh, squills, mustard, stramonium, strophantus, taraxacum, valerian, and ginger.

A comparison of the proposed limitation for the ash of aloes with the limitations found in foreign pharmacopœias suggests the possible intent of providing for the rather inferior Asiatic or Moka aloes usually sold as Socotrine aloes, which has been found to contain rather large quantities of foreign material. A reasonably pure inspissated juice of the aloe plant when prepared in a cleanly method should readily comply with the requirements made in the German, Swiss, and Netherlands pharmacopœias.

The ash content for cantharides, while it agrees with the limitations included in the Dutch pharmacopœia, is, nevertheless, higher than need be. A number of careful investigators have asserted that a drug of good quality should contain less than eight per cent. of ash.

The proposition to permit 20 per cent. of ash in belladonna leaves appears to be inordinately liberal when compared with the limitation of 10 per cent. of ash for digitalis. Belladonna has a comparatively smooth leaf that would hold little or no sand or dust, while the digitalis leaf, being hairy, is much more readily contaminated by, and is more difficult to rid of, adhering sand and dirt. The figures reported in literature also suggest the desirability of some additional leeway for digitalis and the lack of any serious need for so high an ash content for belladonna leaf.

Colocynth is another drug that appears to have been given a rather high limit and one for which a minimum requirement of ash might be considered in view of the fact that the seed of colocynth has

been found to contain, on the average, much less ash than does the pulp.

Gambir varies considerably in its composition, and, being an extract, is not infrequently contaminated by the deliberate addition of sand and dirt. A number of observers in this country have stated that 6 per cent. of ash should not be exceeded by a drug of good quality, and this would in a general way conform with the limitations made for the closely related drug, catechu, in foreign pharmacopœias.

Lupulin is another drug that has rather a liberal allowance for ash, and, while it is true that the maximum permitted in Austria and Switzerland is usually exceeded by the commercially available product, it has, nevertheless, been repeatedly shown that commercial lupulin can readily be freed from contaminating sand and dirt to such and extent as to bring it below the 10 per cent. limit for ash, and that absolutely pure lupulin obtained directly from the strobiles of the hop will comply with the Dutch pharmacopœial limitation of 6 per cent.

The proposed ash content for squill, while it agrees with the maximum permitted in the Austrian pharmacopœia, appears to be unnecessarily high, when one considers the nature of the drug and the lack of need for providing for inorganic impurities.

The ash content limitations for the several seeds, like anise and fennel, while in accord with the limitations set in foreign pharmacopœias, are generally higher than the figures included in a recent regulation promulgated by the Bureau of Chemistry for these drugs when entered for imports.

The proposition to include limitations for ash insoluble in diluted hydrochloric acid, in connection with the several spices and with senna, while thoroughly well established in the trade, is rather a novel one in pharmacopœial work, and there may be considerable difference of opinion as to the desirability of including such an additional complicating requirement at this time.

Taken as a whole, it must be said that the proposed limitations for ash, while many, are reasonably conservative and comply fairly well with conditions as they exist in the drug market at the present time. Some further comparative study of the requirements, however, should prove interesting and will no doubt lead to the revision of the figures in connection with at least a few of the drugs referred to.

TABLE SHOWING PROPOSED U. S. P. LIMITATIONS FOR ASH COMPARED WITH REQUIREMENTS INCLUDED IN THE GERMAN, AUSTRIAN, SWISS, AND NETHERLANDS PHARMACOPŒIAS, AND THE VARIATIONS REPORTED IN RECENT LITERATURE.

	U. S. P. IX.	German V	Austrian VIII	Helvetian IV	Netherlands IV	Recent literature
Acacia	4	5	3	4	4	1.23– 3.64
Aconitum	6			6		3.6 – 6.
Agar-agar	5					2.6 – 4.
Aloe	4	1.5	1	1.5	1.5	0.65– 5.65
Althæa	8		6	6	3–7	4.6 – 7.31
Amygdala Dulcis	4					
Amylum	0.5	1		0.5	1	0.05– 0.27
Anisum	10	10	10	10		5.6 –18.46
Apocynum	9					3.4
Arnica	9		8			6.2 –11.5
Asafœtida	15	15	10	20	10	5. –63.70
Aspidium	3		3			2.2 – 5.44
Aurantii Amari Cortex	7		6	7		3.7 – 5.5
Belladonnæ Folia	20	15	15	15		2.35–23.5
Belladonnæ Radix	7		6	7		6.07– 7.84
Benzoinum	2	2	2	1.5	2	1.2 – 3.8
Buchu	4					4.2 – 5.80
Calumba	8		6	8		4.8 – 8.2
Cambogia	2					0.5 –18.0
Cannabis	15		15			6.0 –14.44
Cantharis	9	8		8	9	6.5 –10.29
Capsicum	1*	6.5	6.5	6.5		4.3 – 6.6
Cardamomi Semen	8		10	8	8	3.7 – 9.2
Carum	8		7	8		5. –11.9
Caryophyllus	0.5*	8	8	7	6	5.4 – 7.3
Cimicifuga	10					4.87– 9.65
Cinnamomum Saigonicum	2*	5		5	8	1.30– 5.6
Cinnamomum Zeylanicum	2*		5	5		3.3 – 6.83
Coccus	6			6		3.28– 9.41
Colchici Semen	8		8			2.4 – 3.5
Colocynthis	15		7			3.60–13.03
Condurango	12					5.26–16.71
Coriandrum	7.5		7			4.55– 8.10
Cubeba	8	8		8	10	
Digitalis	10		10	10		4.6 –18.5
Ergota	5			5	5	2.6 – 4.3
Fœniculum	10	10	10	10		7. –23.75
Frangula	6		5			3.7 – 6.5

*Ash insoluble in diluted hydrochloric acid.

	U. S. P. IX.	German V	Austrian VIII	Helvetian IV	Netherlands IV	Recent literature
Gambir (Catechu)	9	6	5	5	5	3.03–32.0
Gentiana	6		5	6	2–6	2.5 – 5.42
Glycyrrhiza	7		6	6	6	4.4 – 8.96
Granatum	16		10	15.5	15	3.63–16.60
Guaiacum	4		1	1.5		1.63–11.7
Humulus	8					9.70–10.13
Hyoscyamus	30	24	20			17.39–31.54
Ipecacuanha	1.8–4.5		6	1.8–4	1.8–6	2.83– 9.34
Jalapa	6.5	6.5	5	6.5		3.2 – 7.55
Kino	3			2		1.47– 5.9
Krameria	5		5			1.4 – 4.46
Lactucarium	10				10	4.91– 6.9
Linum	6	5	5	5		3.3 – 5.85
Lobelia	8		8			5.1 –11.65
Lupulinum	16		10	10	6	6.60–38.25
Lycopodium	3	3	3	3	5	1. – 4.10
Matricaria	13		13			12.4 –14.8
Moschus	8			8		
Myristica	5		3	5		1.23– 3.3
Myrrha	8.5	7	6	6	5	4.1 –15.65
Nux Vomica	3.5	3		3.5	3	1.25– 3.62
Physostigma	7					
Piper	2*		5			0.12*– 8.3
Podophyllum	3					3.6 – 5.36
Pyrethrum	5					4.7 – 7.5
Rhamnus Purshiana ...	8		6		10	4.14– 8.7
Rheum	13	12	12	13		7.1 –12.12
Santalum Rubrum	3		5			
Sarsaparilla	10		8			3.6 –34.57
Sassafras	30					27.85–13.38
Scilla	8	5	8	5		1.8 – 4.2
Senega	5		5			2.6 – 5.7
Senna	12	12	10	10	6–8	8.2 –14.32
Senna	3*					
Sinapis Alba	9		5	5	8	5.2 – 8.06
Spigelia	10					7.93–40.81
Stillingia	5					5.42– 6.85
Stramonium	20	20	20			5.8 –22.16
Strophanthus	5		5			3.8 – 4.8
Taraxacum	10		8			5.42–14.8
Tragacantha	3.5	3.5		3.5	3.5	1.88–29.
Triticum	3		3			0.96– 3.31
Uva Ursi			4			2.1 – 7.01
Valeriana	20		10	12		6.8 –32.73
Vanilla	6		10	12		
Zingiber	8	7	5	7	8	3.10– 7.9

*Ash insoluble in diluted hydrochloric acid.

NOTES ON THE ESTIMATION OF MORPHINE AND ON LLOYD'S REAGENT.[1]

By H. M. Gordin and J. Kaplan.

1. Attempt to shake out morphine with a mixture of alcohol and chloroform from a saturated solution of potassium carbonate.

When a saturated solution of potassium carbonate is shaken with alcohol or a mixture of equal volumes of alcohol and chloroform, most of the alcoholic solvent very quickly separates out on the surface of the heavier aqueous layer. This was proved by adding a definite volume of the alcoholic liquid to an equal volume of the saturated solution of potassium carbonate, shaking the mixture vigorously, and reading off the volume of the upper layer after the liquid has separated in two layers. In all cases the volume of the alcoholic layer was only a little less than the volume of the alcoholic liquid originally taken.

Owing to there being no good immiscible solvent for the extraction of morphine from the solution of its salts in water, an attempt was made to saturate such a solution with potassium carbonate and to use a mixture of equal volumes of alcohol and chloroform as immiscible solvent. The aqueous liquid, after being shaken once with an equal volume of the alcoholic liquid, using about 40 c.c. of each for about 0.1 g. of morphine in the form of salt, gave no test, in acidified solution, with Mayer's or Wagner's reagent, while, on the other hand, the alcoholic liquid was found to contain, besides morphine, small amounts of potassium carbonate, together with small amounts of other substances, coming either from impurities in the carbonate, or from a partial decomposition of morphine by the latter, or from both sources. Even when the potassium carbonate was previously washed with alcohol and dried, the alcoholic solution of the morphine contained small amounts of other substances.

It was thought that by washing the residue left after distilling off the alcoholic liquid from the morphine with a saturated solution of the alkaloid the impurities could be eliminated so that the morphine could be determined alkalimetrically. For this purpose definite amounts of morphine were dissolved in acidified water, the solution

[1] Read at the Detroit meeting of the American Pharmaceutical Association, 1914.

saturated with potassium carbonate, either ordinary or previously washed with alcohol, and then shaken with a definite volume of equal volumes of a mixture of alcohol and chloroform. After complete separation of the liquid into two layers, an aliquot portion of the alcoholic layer was drawn off and evaporated to dryness. The residue was washed with a saturated solution of morphine in water until the washings gave no test for potassium carbonate with phenolphthalein, and the morphine determined alkalimetrically, using N/25 H_2SO_4 and N/50 KOH. The indicator was methyl-red.

The experiments showed that in all cases the amount of morphine found exceeded the amount originally taken, the variation being from 2 to 15 per cent. Hence the method, at least in the form here described, is not reliable.

2. Extraction of alkaloids by means of Lloyd's reagent.

Owing to the facility and completeness of precipitation of alkaloids by Lloyd's reagent, it was thought that this reagent could be advantageously used for the quantitative extraction of alkaloids from their original sources or, in general, from the solution of their salts in water.

It is evident that in order to attain this aim it is necessary to prove that the alkaloids, once precipitated by Lloyd's reagent, can be readily and completely recovered from the precipitate containing alkaloid and reagent. With a view of determining this point, the following experiments were carried out:

A definite amount of morphine was dissolved in an excess of dilute sulfuric acid, the alkaloid completely precipitated with an excess of Lloyd's reagent, and the precipitate washed with water till the washings gave no test for sulfuric acid. The precipitate was dried at 60° and then repeatedly extracted with boiling methyl alcohol, which is a very fair solvent for morphine. The solvent was evaporated to dryness, and the residue weighed. This residue was free of sulfuric acid, showing it to be probably free morphine, but its amount was less than 4 per cent. of the morphine originally taken.

The precipitate was then again extracted with methyl alcohol to which a small amount of ammonia had been added, and the residue left after again evaporating the solvent weighed. The total amount of alkaloid recovered by the two successive extractions was about 90 per cent. of the morphine taken.

Another experiment was made with strychnine, using chloroform, which is an exceptionally good solvent for this alkaloid. A dilute

solution of strychnine in water acidified with sulfuric acid was completely precipitated with an excess of Lloyd's reagent, and the precipitate, after thorough washing with water, dried at 60°. A portion of the precipitate containing about 0.2 g. of strychnine was suspended in a little water containing an excess of ammonia, and then repeatedly shaken out with successive portions of chloroform, using 20 c.c. of the latter for the first shaking and 15 c.c. each time afterwards. It was found that even after ten consecutive operations the chloroform did not remove all of the alkaloid, as was shown by evaporating some of the chloroformic extract to dryness, taking up the residue with acidified water, and testing the resulting solution with Mayer's and Wagner's reagents, both of which continued to give a heavy precipitate. Hence by this method it is extremely difficult quantitatively to recover the strychnine from a solution of its salts in water. Whether other methods would be more successful will have to be determined by further experimentation.

3. Attempt to facilitate the removal of strychnine from the precipitate obtained by adding Lloyd's reagent to a solution of a salt of the alkaloid in water.

The precipitate obtained by adding an excess of Lloyd's reagent to an aqueous solution of a salt of strychnine is almost perfectly tasteless, though it contains all of the alkaloid of the original solution. This seems to suggest the veiw that the reagent forms with the alkaloid an exceptionally stable combination, and this view is further strengthened by the fact that, as was shown above, it is extremely difficult completely to recover the alkaloid from the precipitate.

On the other hand, as will be reported later by Dr. McGuigan, the precipitate acts physiologically very much like strychnine diluted with an inactive substance, showing that in the living digestive apparatus the union of alkaloid and reagent is readily disrupted. Since it was reasonable to ascribe this disrupting effect to the digestive enzymes of the animal body, experiments were made in order to determine whether some of these enzymes would show the same disrupting effect *in vitro*. If this were so, dilute hydrochloric acid in presence of pepsin, or chloroform in presence of alkali and either ptyalin or trypsin, readily ought to extract the strychnine from the precipitate. The following experiments were, therefore, carried out with these enzymes:

Pepsin.—The thoroughly washed and dried precipitate obtained

by adding an excess of Lloyd's reagent to an aqueous solution of strychnine sulfate was digested with very dilute hydrochloric acid containing a little pepsin, shaking the mixture for an hour and then filtering. The filtrate was tested with Mayer's and Wagner's reagents. Neither of these gave any indication of the presence of an alkaloid. Hence *in vitro* pepsin has no disrupting effect on the precipitate.

Ptyalin and Trypsin.—The precipitate was suspended in a very dilute solution of ammonia containing either ptyalin or trypsin, and the mixture repeatedly shaken out with chloroform. It was found that even after ten successive treatments with chloroform the precipitate still retained some of the strychnine. Hence these enzymes, too, have no disrupting effect on the precipitate.

NORTHWESTERN UNIVERSITY SCHOOLS OF PHARMACY AND DENTISTRY.

THE SIXTY-SECOND ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The 1914 meeting of the American Pharmaceutical Association was held in the city of Detroit during the week of August 24–29, 1914, and was, in fact, a joint meeting of that Association with the Michigan State Pharmaceutical Association, the Michigan Pharmaceutical Travelers' Association, the Conference of Pharmaceutical Faculties and the National Association of Boards of Pharmacy. More than 800 persons were registered, and the sessions of the several associations enumerated and also the scientific meetings of the several sections of the American Pharmaceutical Association were very well attended. It was not unusual to have four, and even five, sessions going on at the same time, so that it would be practically impossible for any one person to reflect the proceedings even in part, and in this report nothing more ambitious will be attempted than to try and reflect in outline the happenings of the week as they appealed to an interested participant.

The first general session of the Association was called to order by President George M. Beringer on the afternoon of August 24th. The local committee had very considerately neglected to provide the usual addresses of welcome, so that, contrary to established pre-

cedent, the proceedings were inaugurated by the reading of the President's address.

The address presented this year was an unusually comprehensive communication that touched on many important features of association work and embodied a number of recommendations that should contribute materially to make for real progress in true pharmacy. The address was listened to attentively by all of the members present, and was subsequently referred to a committee of five to report at a later session.

Following the reading of the address of the president, a number of representatives and delegates were requested to present felicitations or reports, and these addresses, with the usual recess for the selection of members of the nominating committee, served to extend the first general session to about the usual late hour for adjourning.

The second general session of the Association was devoted largely to routine business, including the presentation of reports of the various committees. The only item of business regarding which there appeared to be a difference of opinion was the report of the committee on time and place of next meeting, and this was made the special order of business at an extra session held on Friday evening.

Many of the members of the Association are interested only in the work of one or the other of the sections, and these members, at least, had no cause to be dissatisfied.

The programs of the several sections of the Association included a total of more than 125 communications, some of which were of more than usual interest. In the following paragraphs an effort will be made to reflect the nature of the programs themselves rather than attempt to present a comprehensive review of what was said by the individual essayists.

The Section on Scientific Papers, or "Scientific Section," as it was generally designated on the programs for this year, had, as usual, a liberal and varied selection of communications. Edsel A. Ruddiman, of Nashville, Tenn., presided, and Wilbur L. Scoville, of Detroit, served as secretary. The printed program contained a total of 42 titles, including discussions on: Radium, biological products, immunology, pharmacodynamic assay methods, the assay of opium, the manufacture of fluidextracts, the nature of the menstruum for official tinctures, the estimation of calomel, the physical properties of volatile oils, the growing of plant drugs, the differentiation of true oil of wintergreen from synthetic methyl salicylate, and many other

subjects equally interesting to the pharmacist who is at all desirous of keeping in touch with the progress that is being made along scientific lines. The papers presented this year, while perhaps not epoch-making, serve to reflect progress in a variety of lines of research.

Three sessions were held and ample time given for the discussion of the several communications that were presented.

At one of the sessions of this section the scope of Hygienic Laboratory Bulletins entitled "Digest of Comments on the Pharmacopœia of the United States of America and on the National Formulary" was discussed and a resolution adopted, the purport of which was that the Digest of Comments be continued along the lines on which it has been developed, and that, if possible, future volumes of the compilation be published more promptly so as to make them increasingly valuable to the workers in scientific pharmacy, who find the publication useful as a reference book on current literature relating to articles included in the Pharmacopœia and the National Formulary.

The officers for the coming year are: Chairman, Herman Engelhardt, Baltimore; secretary, William Mansfield, New York.

The Section on Education and Legislation, under the able direction of Hugh Craig, Chicago, as chairman, and F. H. Freericks, Cincinnati, as secretary, was scheduled for three sessions with a program including some 18 communications. Legislation and the need for enforcing existing laws were discussed at some length. The chairman, in his address, expressed the opinion that legislation is an over-exploited remedy for pharmacal ills and that education, while slower, is more promising. He also called attention to some of the educational needs of pharmacy, and deplored the lack of efficient pharmacal educators.

The report of the Committee on National Legislation and of the delegates to the Drug Trade Conference was followed by a rather lively discussion on legislative matters. The section subsequently adopted a resolution endorsing the Harrison anti-narcotic measure in the form in which it passed the Senate, and urged its final adoption into law.

The officers of the section for the coming year are: Chairman, F. R. Freericks, Cincinnati; secretary, R. A. Kuever, Iowa City.

The Section on Practical Pharmacy and Dispensing, under the direction of the chairman, F. W. Nitardy, Denver, and the secretary, Cornelius Osseward, of Seattle, introduced a rather novel feature in the nature of experience meetings that, continued at future meetings,

might well serve to bring about an appreciation of existing conditions in pharmacy and thus make for an unprecedented degree of progress. The program for this section, while it contained but a total of 25 titles, occupied no less than five sessions, two of which were held during the boat ride on Thursday afternoon and evening. The chairman himself presented two exceptionally interesting communications, one on the dispensing of ointments in collapsible tubes, and the second on the preparation of flake agar-agar. For the latter purpose he recommends moistening the substance with water, passing through an ordinary meat-chopper, and then thoroughly drying.

By far the greater amount of time at three of the sessions was devoted to the consideration of a number of pharmaceutical queries. The answers that were offered evidenced the need for developing practical commercialism in pharmacy if pharmacists are to retain any of the business that should be theirs. The material offered, while not particularly reassuring so far as present-day conditions may be concerned, was nevertheless promising, and if repeated, particularly in connection with local branch meetings or in connection with actual demonstrations, would go far toward bringing about necessary reforms in future. The officers for the coming year are: Chairman, Cornelius Osseward, Seattle; associate, D. F. Jones, Watertown, S. D.; secretary, I. A. Becker, Chicago.

The Section on Pharmacopœias and Formularies presented a program containing 12 communications and a general discussion on 400 or more new or modified preparations proposed for the U. S. P. IX and the N. F. IV. The section proceedings were conducted by E. Fullerton Cook, of Philadelphia, and in the abscence of the secretary John K. Thum, of Philadelphia, was elected to act as secretary. In accordance with a decision of the Council, this section becomes a sub-section or branch of the Section on Practical Pharmacy and Dispensing, as which the work so successfully inaugurated during the two years of its existence as a distinct section will no doubt be continued.

The Section on Commercial Interests, under the very able management of Harry B. Mason, of Detroit, who had been appointed to serve as chairman in place of Gus Lindvall, resigned, devoted two sessions to the discussion of twenty or more communications. By far the greater number of the papers on the program were matters relating to practical pharmacy, while others had little or nothing to do with pharmacy and were, therefore, not germane to a meeting

that should make for progress in pharmacy as such. The chairman, in his address, properly asserted that the existing "scorn of commercialism in the drug business is the worst kind of stupidity." It is equalled, perhaps, only by that of "the old-school pharmacist" who persists in speaking of the "ethical" pharmacist and of "ethical" pharmacy. In concluding his address the chairman made the prediction that the college or school of pharmacy which now essays to teach its students the science of pharmacy will within the next 50 years to come really teach them how to run a drug store. This prediction involves a degree of progress in pharmacy that many persons would be pleased to see brought about in much less time than the limit set by Mr. Mason. The officers of this section for the coming year are: Chairman, E. H. Thiesing, Cincinnati; secretary, M. Stolz, Syracuse.

The Historical Section held a well-attended session, at which a number of matters of pharmaceutic interest were discussed. W. C. Alpers, Cleveland, presided, and F. T. Gordon, Philadelphia, served as secretary. Prof. Edward Kremers, in the course of a lecture on "The Study of the History of Pharmacy," demonstrated, by the exhibition of a number of lantern slides, that the subject could be made both interesting and profitable to pharmaceutical students and might well be made an integral part of the pharmaceutical curriculum. The officers of this section for the coming year are: Chairman, F. T. Gordon, Philadelphia; secretary, A. H. Clark, Chicago; historian, E. G. Eberle, Dallas, Texas.

The meetings of the Women's Section were presided over by Mrs. J. G. Godding. A number of interesting papers were read and discussed, and the section is to be continued as heretofore. The officers elected for the coming year are: President, Mrs. John Culley, Ogden, Utah; secretary, Miss Anna J. Bagley, Columbus, Ohio.

The House of Delegates is reported to have had credentials from 261 delegates, representing 100 organizations. Clyde M. Snow, Chicago, presided, and at the concluding session a number of resolutions were adopted and referred to the Council of the Association. The officers for the coming year are: Chairman, W. S. Richardson, Washington; secretary, J. Weinstein, New York.

In addition to the meetings already referred to, the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties each held a number of sessions, and a joint meeting of these two bodies with the Section on Education and

Legislation of the American Pharmaceutical Association was held on the evening of August 28th.

The Committee of Revision of the United States Pharmacopœia held rather a prolonged conference, at which several highly important matters were discussed. The Committee on National Formulary took advantage of the opportunity to conclude the week by holding several protracted meetings, at which a number of questions in connection with the revision of that book were finally decided, so that the manuscript may now go to the printer.

The final general session, while an unusually long one, will have been well worth the time devoted to it if the changes that were provided for are actually put into operation at future meetings. The amendments to the by-laws that were adopted provide for a material concentration of the work of the sections, including the practical amalgamation of the Section on Pharmacopœias and Formularies with the Section on Practical Pharmacy and Dispensing. The work of other sections is also more clearly outlined and will obviate any agitation for additional sections in the near future.

The report of the Committee on President's Address aroused considerable discussion, and some of the recommendations made by the committee were not approved of. The report of the same committee on the recommendations made by the former secretary of the Association, Prof. Jas. H. Beal, was, on motion, referred to the Council with power to act.

Among the resolutions approved by the Association at this final session were:

A resolution to draft a bill designed to reform the present patent law so as to compel the manufacture in this country of all medicinal products protected by patent;

A resolution endorsing the proposition that graduates in pharmacy only be appointed as members of Boards of Pharmacy;

A resolution endorsing the proposed Congress of National Drug and Pharmaceutical Associations, the object of this resolution being to bring about some form of correlation in the work of the several organizations;

A resolution endorsing bills now pending to bring about standardization of prices on proprietary medicines;

A resolution objecting to the imposition of a stamp tax on proprietary medicine;

A resolution designed to develop the production of botanical drugs in the United States; and

A resolution commending the present scope of the Hygienic Laboratory Bulletins embodying a Digest of Comments on the Pharmacopœia of the United States of America and on the National Formulary, and asking that, if practicable, these bulletins be published more promptly.

Following the usual vote of thanks to the local committees, and a special vote for the local secretary, the officers for the ensuing year were installed and the 62nd annual meeting of the American Pharmaceutical Association was declared adjourned.

Any account of this meeting without some reference to the elaborately planned and carefully carried out social features would be incomplete at best. The local secretary and his efficient assistants had for the nonce devised a program in which the social features did not conflict with the business meetings of the Association or any of its sections, and, despite the very liberal duplication of section sessions during the day, the evenings were free to all but Council members and delegates, to enjoy as they saw fit.

The program as arranged served not alone to provide large and interested audiences at all of the sessions of the Association, but also insured ample time to permit members of the Association to take part in the several outings and informal gatherings that had been provided.

The supper and smoker on Wednesday evening and the river excursion on Thursday afternoon were attended by upwards of 1000 members and friends, and will long be remembered as being among the most unique of the functions held in connection with meetings of the American Pharmaceutical Association.

The graduates of the Philadelphia College of Pharmacy present at the meeting were entertained at luncheon on Wednesday at noon by Frank G. Ryan, a graduate and for some years one of the assistant professors of the college. A total of 53 graduates, representing 21 States, was present, and the occasion offered an unusual opportunity to make and to renew acquaintances among graduates of the college.

The officers of the American Pharmaceutical Association for the coming year are: Honorary president, G. H. Schaefer, Fort Madison, Iowa; president, Caswell A. Mayo, New York; vice-presidents, L. D. Havenhill, Lawrence, Kan., C. H. Packard, Boston, Mass., Chas. Gietner, St. Louis, Mo.; permanent secretary, W. B. Day,

Chicago, Ill.; treasurer, H. M. Whelpley, St Louis, Mo.; reporter on the progress of pharmacy, C. Lewis Diehl, Louisville, Ky.

The nominees to be voted for by mail are:

For president: W. C. Alpers, Cleveland; W. J. Teeters, Iowa City, Iowa; L. D. Havenhill, Lawrence, Kan.

For first vice-president: C. H. LaWall, Philadelphia; L. A. Seltzer, Detroit; D. F. Jones, Watertown, S. D.

For second vice-president: E. H. Ruddiman, Nashville, Tenn.; E. O. Kagy, Des Moines, Iowa; F. W. Nitardy, Denver, Col.

For third vice-president: L. A. Brown, Lexington, Ky.; E. N. Gathercoal, Chicago, Ill.; Cornelius Osseward, Seattle, Wash.

For member of Council: F. M. Apple, Philadelphia; Philip Asher, New Orleans; E. C. Bent, Dell Rapids, S. D.; H. V. Arny, New York; Charles B. Jordan, Lafayette, Ind.; R. H. Walker, Gonzales, Tex.; J. O. Burge, Nashville, Tenn.; Andrew Scherer, Chicago; Caswell A. Mayo, New York.

The 1915 meeting of the Association is to be held in San Francisco, Cal., at a time to be fixed by the Council.

THE IDENTIFICATION OF ARTIFICIAL SILKS ESPECIALLY PREPARED FOR THE PRACTICAL MILL MAN AND DYER.[1]

By Louis J. Matos, Ph.D.

Owing to the constantly increasing use of artificial silks and the consequent confusion arising in dye-houses and silk mills generally, due to the occasional, though unintentional, mixing of lots, it becomes a matter of some importance for the dyer or manager to be able to identify with certainty the several important kinds of artificial silks on the market.

Where a dyer goes on from day to day with his work, and on one kind of silk, it is a matter of some consequence when he finds himself confronted with the problem of dyeing a new lot of different kind of silk that does not come out as expected, or which seems to offer difficulties during the dyeing.

Many instances are familiar to dyers where lots of mixed artificial silk have been sent to the dye-house, and inequality in the dyeing was

[1] Reprinted from *The American Silk Journal*; *Dyestuffs*, Dec., 1913, No. 12.

not discovered until near the end of the operation, when it became a matter of great skill to bring up the shade of the indifferent skeins to the shade of the main lot. This condition could have been anticipated had the dyer been acquainted with the fact that the entire lot of silk was not of one kind.

From time to time there have been published tests and reactions with chemicals to be used in distinguishing the several kinds of artificial silks, but the practical application of which, in the dye-house or office, seems to offer some obstacles in the hands of those not actually acquainted with the details of making reactions. It seems that while the method of making the tests is simple enough, the greatest difficulty is in having the solutions or reagents properly compounded and in conducting the tests afterwards.

Simple descriptions alone do not seem to meet the case entirely. Of course, there is nothing to take the place of a practical demonstration of a testing method when carried out by one who is practically familiar with the proper sequence of the operations.

On the other hand, many of the methods for fibre testing that have been published, while apparently intended for dyers and practical mill men, being those most concerned, are, as a rule, written for the chemist with some experience, as only such could possibly have the unusual reagents and apparatus, or even the apparently delicate manipulative skill, to handle both satisfactorily.

Without question, the most satisfactory means to identify artificial silk is to make use of the microscope, but as very few mills are equipped with this valuable instrument, and fewer still are proficient in making use of it, we will omit its discussion as applied to artificial silk and confine ourselves exclusively to the chemical or *wet methods* that experience has taught us as being the most satisfactory.

To identify artificial silk properly requires that the person attempting the work should have at hand a small set of chemical reagent bottles of not more than two-ounce capacity and with glass stoppers. Such bottles are not costly and may be obtained through a local druggist; the style known as "XX Tinctures" are admirably suited for the purpose. They are to be filled with the following reagents, which can be procured from a chemical supply house or prepared by a friendly pharmacist or chemical friend.

The following constitutes the list and the methods for their preparation:

No. 1. *Glycerinated Sulphuric Acid.*

Pure Glycerin	10 c.c.
Distilled Water	5 c.c.

Add slowly with constant stirring, a few drops at a time, Pure Concentrated Sulphuric Acid ..... 15 c.c.

No. 2. *Iodo-iodide of Potassium.*

Distilled Water	30 c.c.
Potassium Iodide	0.3 gr.
Iodine, an excess.	

No. 3. *Chlor-iodide of Zinc.*

Distilled Water	30 c.c.
Fused Chloride of Zinc	1.75 gr.

Filter and add to clear filtrate Iodine to saturation.

No. 4. *Cold Concentrated Sulphuric Acid.*

No. 5. *Half Saturated Chromic Acid.*

No. 6. *A 40 per cent. Caustic Potash Solution.*

No. 7. *Copper-Oxide-Ammonia.*

This is an important reagent in all fibre work. It should be made with great care by preparing a solution of copper oxide in ammonia to saturation, and passing through it a current of air freed from carbon dioxide, by first being passed through a solution of caustic potash.

No. 8. *Nickel Oxide Ammonia.*

Nickel Sulphate in crystals	2 gr.
Water	30 c.c.

Precipitate the nickel with caustic soda and filter; then dissolve the precipitate in a mixture of:

Concentrated Ammonia	8 c.c.
Water	8 c.c.

No. 9. *Alkaline Copper Glycerin Solution.*

Sulphate of Copper	3 gr.
Water	30 c.c.
Glycerin	1.75 gr.

to which is added a sufficient quantity of caustic potash solution to precipitate the copper and redissolve it.

No. 10. *Diphenylamine-Sulphuric Acid Solution.*

Diphenylamine	1.57 gr.
Concentrated Sulphuric Acid	25 c.c.

The operator should keep these bottles in a closet when not in use and at all times free from dust. The label, besides the name, should also have the formula written upon it.

The apparatus required to make the tests consists of a dozen small plain white butter dishes, a dozen small test-tubes of short length and not over half an inch in diameter, and a spirit lamp or Bunsen burner to supply heat. There should also be at hand small bottles or tubes containing red and blue litmus paper. The entire outfit is procurable under five dollars.

There are five kinds of artificial silk generally met with in commerce, as follows:

Collodium Silk (Strictly nitro silks).
Cellulose Silks.
Viscose Silks.
Acetate Silks.
Gelatin Silks.

The first important test to make is to determine whether the silk under examination is made from gelatin or not.

Take one of the test-tubes, see that it is clean and dry inside, and place at the bottom of it a small tuft of the silk about the size of a small pea when rolled between the fingers. In the open end of the tube insert a piece of red litmus paper, bending the end over so that the strip will not slide down the tube.

With a handle made of several folds of paper around the neck of the tube so as to permit one to hold it comfortably, place the closed end of the tube in the flame of the Bunsen burner or spirit lamp, giving the tube a slight to and fro motion until the fibres in the tube begin to char and vapors are seen to arise. When these vapors are observed to come out of the open end of the test-tube, note whether the color of the red litmus paper changes to blue. If such a change takes place it is due to the presence of ammonia gas resulting from the charring of the fibres and which could only come from gelatin silk. These vapors may also have the odor of burning horn or hair, which odor is further indicative of the presence of gelatin.

On the other hand, if the litmus paper does not change color, acid fumes may be present and are to be confirmed by repeating the test, but using *blue* litmus paper, and upon it turning red, indicates that the silk may be any one of the four above-named makes.

To distinguish finally between the several artificial silks emitting acid fumes with heat, place two of the butter dishes side by side; in one, place some of the silk fibre and upon it pour some of reagent No. 1, and let soak for a few minutes, and then afterwards add a

few drops of reagent No. 2. In the second dish put some of the fibre and a small amount of reagent No. 3, and note carefully what changes in color, if any, take place. If both samples show a distinct yellow coloration, the silk is *Acetate Silk.*

On the other hand, if the coloration is blue, the silk may be either *collodium, cellulose* or *viscose silk,* which is confirmed if the coloration shown in the second dish is reddish-violet. To differentiate between these three silks just mentioned, place a small tuft of the fibres in a dry dish and pour upon it a small amount of cold concentrated sulphuric acid (No. 4). If the silk dissolves rapidly, the specimen is either collodium or viscose silk; cellulose silk, *i.e.,* Pauly, Fremery, etc., dissolves slowly.

Confirmatory tests are made in test-tubes with the chromic acid solution (No. 5) in the cold, when these three silks dissolve gradually, and upon the tube being heated, dissolve quickly. When treated in the same manner with warm caustic potash solution (No. 6) these three silks, together with the acetate silk show a distinct swelling, while *gelatin silk* dissolves rapidly and completely.

The copper oxide ammonia test (No. 7) when applied in a test-tube first causes a swelling and dissolves collodium and viscose silks, but acetate silk swells without dissolving, and gelatin silk takes a bluish-violet coloration without dissolving.

The nickel-oxide-ammonia reagent (No. 8), when applied both cold and warm to a sample of artificial silk in the test-tube, causes a swelling of the fibres but without dissolving them. This applies to collodium, cellulose, viscose, and acetate silk, but not to gelatin silk, which latter takes a brown coloration without dissolving.

The alkaline-copper-glycerin solution (No. 9) has no action even after long boiling upon the first four silks above mentioned, but gelatin silk dissolves after a short time.

A convenient reagent for artificial silk is the concentrated sulphuric acid-diphenylamine solution (No. 10) which has been extolled as the one reagent for this class of work, but as a matter of fact its usefulness is limited exclusively to differentiate only the nitro silks from the others. With nitro silks of the Chardonnet type, it causes a distinct blue coloration, while the other silks remain uncolored. This diphenylamine reaction lasts but a comparatively short time, reaching its maximum intensity within five minutes after adding the reagent, when it gradually disappears.

In order to be in the position where one can absolutely and

certainly pass judgment upon the identity of a given silk sample, the operator should have at hand a collection of true type samples obtained directly from the artificial silk manufacturers and to make the above outlined reactions repeatedly, systematically and with care. By care is meant not being too hasty in forming a conclusion, and to disregard and reject completely any test that one may have made, into which the element of doubt enters.

With such a set of proved samples at hand and a set of reagents as above outlined, when unusual lots are received by the dye-house, or where silk is received from unfamiliar sources, its identity can be accurately determined.

The foregoing details refer to undyed artificial silk, but to identify dyed silk by chemical means requires that it should be stripped of its color, which is generally very easily accomplished by means of Hyraldite or some other equally efficient stripping agent.

BOOK REVIEWS.

THE ART OF COMPOUNDING. A Text-Book for Students and A Reference Book for Pharmacists at the Prescription Counter. By Wilbur L. Scoville, Ph. G., formerly Professor of Theory and Practice of Pharmacy in the Massachusetts College of Pharmacy; member of the Eighth Committee on Revision of the United States Pharmacopœia and of the Second and Third Committees of the Revision of the National Fomulary. Fourth edition, revised and enlarged, with 76 illustrations. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut Street. $3 net.

This excellent volume, prepared by the author when he was a professor in the Massachusetts College of Pharmacy, has become one of the most popular books on the prescription and its compounding that we have. That it has run through four editions shows that both the publisher and author are alive to the progress that is being made in pharmacy and the development of this subject in particular. Among the innovations in the present volume may be mentioned the inclusion of illustrations. These are numerous, and not only include the implements for preparing small quantities of remedies, as in general prescription work, but also the forms and apparatus in use by manufacturers. The author's wide experience in all phases of the

drug business makes him unusually well qualified to handle manufacturing processes in a practical way.

For the purpose of adding interest to the study of individual prescriptions, some 225 prescriptions from State Board examinations have been added in a systematic way. This compilation will be found to be of great value to the apprentice in his study of the methods of mixing and conditions suitable for their compounding. A valuable chapter on biological products has been added and will prove of great interest to pharmacists. The new developments in the pharmaceutical applications of sterilization are noted in several portions of the book.

THE ELECTRICAL CONDUCTIVITY AND IONIZATION CONSTANTS OF ORGANIC COMPOUNDS. A bibliography of the periodical literature from 1889 to 1910 inclusive, including all important work before 1889 and corrected to the beginning of 1913. Giving numerical data for the ionization constants at all temperatures at which they have been measured; and some numerical data of the electrical conductivity. By Heyward Scudder. New York: D. Van Nostrand Company, 25 Park Place. 1914. $3 net.

This is a very valuable compilation, containing all of the valuable data on the electrical conductivity and ionization of organic compounds, practically everything of value being included, with very few exceptions. The references to subjects of biological interest, as albumin, blood, sap, etc., are complete only for the last few years (roughly, the last five or ten), but afford a means both of knowing where to get at the important work, which is all recent, and where to start in any more thorough search of the literature. Neither are the references to the resistance of substances such as rubber, wood, etc., given, as they are of value chiefly in connection with the question of electrical insulation, although they have some biological interest. References to the conductivity of inorganic compounds in organic solvents have not been looked up specially, though in cases where salt formation is to be expected they have been taken. In addition, a number of references are given on the conductivity of molten salts as well as certain inorganic compounds. In the tables a number of references are given to the work on the comparative strength of different compounds (measured in various ways), because to many chemists the chief value of the ionization constant of a compound, or of a measurement of its electrical conductivity, is to determine its strength as an acid or a base.

The book is divided into a set of tables arranged according to the names of the compounds, containing all the data that may be given, with a bibliography of all the references to each compound; a formula index to the compounds; a bibliography arranged according to the names of authors; a subject index to certain subjects; and a journal list giving the names of all journals examined, with the number and date of the last volume examined.

CHEMICAL REAGENTS. Their Purity and Tests. Authorized translation of "Prüfung der Chemischen Reagenzien auf Reinheit" (Zweite Auflage) von E. Merck. By Henry Schenck, Second edition. New York: D. Van Nostrand Company, 25 Park Place. 1914. $1 net.

This translation in method of treatment, closely resembles that of the German work. It includes, however, numerous articles which have come into prominence since the earlier work was published. Among the subjects included for the first time in this edition the following may be mentioned: Alphanaphthylamine, Ammonium Chromate, Ammonium Molybdate Solution, Ammonium Persulphate, Benzidine for Blood Test, Bismuth and Potassium Iodide Solution, Carbon Tetrachloride, Carmin-Fibrin, Chromium Trioxide for Carbon Determination, Cobalt Nitrate (Free from Nickel), Cobalt Oxide, Copper Hydroxide, Copper Oxide-Asbestos, Devarda's Metal, Dicyandiamidine Sulphate, Dimethylglyoxime, Dimethylparaphenylenediamine Hydrochloride, Ferric Oxide, Glass Wool, Hydrazine Sulphate, Indigo Carmin, Indigo Solutions, Lead Peroxide, Granulated Magnesia Mixture, Magnesite, Manganese Metaphosphate Solution, Methyl Red, Platinized Pumice Stone, Poirrier's Blue C4B, Potassium Persulphate, Quartz Sand, Sea Sand, Silver-Asbestos, Sodium-Cobaltic Nitrate Solution, Tetramethylparaphenylenediamine Hydrochloride, Yellow Oxide of Mercury.

A number of changes have been made, some of these having materially raised the standard of purity. Coincident with this improvement is the inclusion among the references of important new contributions upon the uses and methods of testing reagent chemicals. The tables of equivalents of standard solutions have been replaced, in response to a suggestion, by a table giving approximate strengths and brief directions for the preparation of solutions for reagent purposes, compiled from published writings. Another valuable feature in this translation is the parenthetical statement appended to each

test, giving in terms of percentage the minimum amount of the impurity which would be recognized by the test. This work will be found of very great value to analysts in the examination of reagents.

A CRITICAL REVISION OF THE GENUS EUCALYPTUS. By J. H. Maiden, Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney. Parts XVIII to XXI. Published by authority of the Government of the State of New South Wales. Sydney: William Applegate Gullick, Government Printer. 1913.

These valuable monographs by Mr. Maiden continue to be of very great interest. In the most recent pamphlets the following species are critically considered: *Eucalyptus macrocarpa,* Hook, *Eucalyptus Preissiana,* Schauer, *Eucalyptus megacarpa,* F. v. M., *Eucalyptus globulus,* Labillardiere, *Eucalyptus Maideni,* F. v. M., *Eucalyptus urnigera,* Hook f., *Eucalyptus goniocalyx,* F. v. M., *Eucalyptus nitens,* n. s. d., *Eucalyptus elæophora,* F. v. M., *Eucalyptus cordata,* Labill., *Eucalyptus angustissima,* F. v. M., *Eucalyptus gigantea,* Hook, *Eucalyptus longifolia,* Link and Otto, *Eucalyptus diversicolor,* F. v. M., *Eucalyptus Guilfoylei,* Maiden, *Eucalyptus patens,* Bentham, *Eucalyptus Todtiana,* F. v. M., *Eucalyptus micranthera,* F. v. M., *Eucalyptus cinera,* F. v. M., *Eucalyptus pulverulenta,* Sims, *Eucalyptus cosmophylla,* F. v. M., *Eucalyptus gomphocephala,* A. P. DC.

ANNALES DU MUSEE COLONIAL DE MARSEILLE fondees en 1893 par M. Le Professeur Dr. Edouard Heckel et publies sous sa direction. Vingt-et-unieme anne. 3e series 1er volume (1913). Marseille Musee colonial 5, Rue Noailles, 5 1913.

This volume contains the following monographs: Palms of Madagascar, by MM. H. Jumelle and H. Perrier; Botanical Study of Caysen, an Oleaginous Seed of Sapotaceæ, by Narcel Dubard; Contributions to the Anatomy of the Dypsideæ Palms of Madagascar, by M. J. Achilli; The Orchidaceæ of Madagascar, by M. R. Schlechter; The Cultivated Plants of Central Africa, by M. A. Baudon; A Melastomaceous Plant *Osbeckiees malgaches,* by H. Jumelle and H. Perrier; Analysis of a Tabachir of Indo-China, by E. Laborde.

A large number of very excellent drawings and photographs accompany this volume, and the researches are of very high class. The first volume of the Colonial Museum of Marseilles was published in 1893, so that for more than twenty years the studies on products of the French colonies have been published, reflecting very great credit upon the director, Professor Heckel.

OBITUARIES.

David H. Ross.

David H. Ross, of the class of '78, died at his residence and place of business, Almond and Norris Streets, Philadelphia, after a brief illness due to pneumonia. At the time of his death he was 69 years of age and had conducted a retail drug business at his home address for nearly thirty years. Mr. Ross was born in Ireland of Scotch parentage, and came to Philadelphia in his youth. His experience in the drug business was acquired with the firm of Bullock and Crenshaw, for whom he worked as a drug clerk, and, after his graduation, as a salesman. Nearly all his life the deceased was active in pharmaceutical affairs, and held many positions of honor and trust.

He was president of the Alumni P. C. P. in 1893; and for many years was secretary-treasurer of the Philadelphia Wholesale Drug Company. The Philadelphia Association of Retail Druggists, of which he was an active member, also made use of the services of Mr. Ross on many occasions. He was also made treasurer of the Druggists' Building and Loan Association when it was organized a short time ago. He was active in the management of the First Presbyterian Church of Kensington, of which he was an elder. In addition to his other activities, he for many years took a practical interest in political matters and served on the Executive Committee of the Washington party, and was elected to Councils upon the Reform party ticket. He also served as a school director in his home ward for a number of years.

Personally Mr. Ross was aggressive and active in everything he took in hand, and was unusually outspoken and frank in attacking what he considered wrong; and was just as quick to defend what he considered to be right, in the same characteristic manner. Behind the aggressive man of action there was, however, a true man in the broader human sense who endeared himself by strong ties to those who learned to know him well.

W. L. Cliffe.

Peter P. Fox.

Peter P. Fox, of the class of 1858 of the Philadelphia College of Pharmacy, died on April 24, 1914. He was one of the oldest graduates of the College, and had been a member since 1872. Mr. Fox was born in Leimbach, near Audenaw, Germany, in 1835. He was a Brother of Prof. John Fox, M.D., who graduated from the University

of Bonn, Germany, and was prominently known before the Civil War as a teacher of languages to the children of many of our conspicuous families of those days in Philadelphia. In the War of the Rebellion he enlisted in the 99th Pennsylvania Volunteer Infantry, and served for two years and eight months. At the expiration of his service he came to Philadelphia and started a drug store at Seventy-third Street and Woodland Avenue, West Philadelphia, where he continued the business until his death. Mr. Fox was allied with the American Pharmaceutical Association, the Philadelphia Association of Retail Druggists, and various other bodies. The funeral of Mr. Fox took place on Monday, April 27th, with a Solemn Requiem Mass at St. Clement's Church, Paschalville, of which he was a devout communicant for many years. The remains were laid at rest in New Cathedral Cemetery.

CURRENT LITERATURE.

GASEOUS IMPURITIES IN THE AIR OF RAILWAY TUNNELS.—Seidell and Meserve, in Hygienic Laboratory Bulletin No. 92, have taken up the question of the composition of the air in railway tunnels, and summarize their work as follows:

(*a*) On account of the particular conditions in hand, methods for the determination of sulphur dioxide based upon the aspiration of the sample through a small volume of liquid followed by a gravimetric or volumetric determination of the retained sulphur dioxide could not be used. The several possible variations of the iodometric titration were examined and the general source of the errors discussed. It was finally shown that a method of direct titration with N/1000 iodine solution gave, after applying proper correction factors, results of satisfactory accuracy.

(*b*) Experiments upon the rate of loss of sulphur dioxide on standing showed that in the presence of moisture only a small fraction of the used sulphur dioxide was recovered after one hour. In dry bottles there is usually an inconsiderable loss within the first two hours, although with very dilute mixtures an appreciable loss may occur after one-fourth to one-half hour.

(*c*) Of quite small amounts of sulphur dioxide liberated in a closed room only about 30 to 60 per cent. could be recovered, depending upon the amount of stirring and the moisture content of the air.

(*d*) In adapting the iodine pentoxide method to the determination of carbon monoxide in the samples of tunnel air, manipulative improvements involving the use of a new form of absorption bulb and

of a closed aspiration system were developed. The time for a determination was decreased to about one-fourth and the attention which the apparatus required during the passage of the sample through it was reduced to a minimum.

(*e*) Analyses of mixtures of very small amounts of carbon monoxide with air showed that from 88 to 98 per cent. of the amount present was recovered by the method. On account of the very small actual amounts under consideration, these losses are considered negligible.

(*f*) The results of the analyses of 88 samples of air from the two tunnels show that on an average there is approximately five times as much of each of the two gases in the Fulton as in the electrified tunnel. In the case of the Fulton Tunnel, the highest amounts were 15.1 parts of sulphur dioxide per million and 267 parts of carbon monoxide per million. The corresponding figures for the electrified tunnel were, respectively, 2.9 parts and 25 parts.

(*g*) A review of the available literature upon the physiological effects of small amounts of carbon monoxide and sulphur dioxide showed that the concentrations of these gases which produced an unmistakable harmful effect upon man were somewhat greater than the maximum amounts which were found in any of the tunnel-air samples.

KIESELGUHR INDUSTRY.—P. A. Borck in an article (*Metall. and Chem. Engin.*, xii, 109).—This article treats of the properties of kieselguhr, its occurrence at Lompoc, California, and other places, and its treatment. Natural blocks can be obtained by sawing the material; these blocks are fairly strong, have high insulating value, stand heat and cold well, except as to a slight shrinkage, and melt at 1610° C. Light-weight kieselguhr bricks are produced by properly burning the material; they insulate well up to red-heat, but shrink at high temperatures, and must be protected against sudden changes of temperature. They are recommended as backing for more refractory bricks.—*Jour. Franklin Ins.*, 1914, p. 382.

SUPPLY OF POLLANTIN AFFECTED BY WAR.—*Fritzsche Brothers*, New York, advise that their stock of Pollantin *Liquid* (Dunbar's serum in hay fever) is exhausted; and that, due to the lamentable war conditions, they are unable to replenish in time for the *current* season's demand.

Also, that but a very limited supply of the Pollantin Powder and Ointment is available.